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[OFFICIAL NOTICE.]

Ohio Gas Light Association.

The Second Annual Meeting of the Ohio Gas Light Association will be held in the Arcade Hotel, Springfield, Ohio, on Wednesday and Thursday, March 17th and 18th.

IRVIN BUTTERWORTH, Sec'y.

[OFFICIAL NOTICE.]

Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION,
QUINCY, ILL., March 9, 1886.

The Ninth Annual Meeting of the Western Gas Association will be held at Columbus, Ohio, on the 12th, 13th and 14th days of May.

Mr. E. McMillin, Chairman of our local Committee of Arrangements, informs us that the Neil House, a hostelry commodious and first class in every respect, as all who have ever enjoyed a sojourn within its hospitable walls can testify, has been chosen as the headquarters of the Association. The business sessions will be conducted in an assembly room (well adapted for the purpose) within the hotel building, thus leaving nothing to be desired on the score of convenience. The rates to members will be as follows: First floor, $4.00 per day; second floor, $3.50; third floor, $3.50 and $3.00, according to size and location of rooms; and fourth floor, $3.00. The Neil House is equipped with a good elevator, and all of the other modern improvements possessed by any hotel in the West.

A hearty invitation to meet with the Western Gas Association, on the occasion of its ninth annual re-union, is extended to every member of the fraternity.

Respectfully, A. W. LITTLETON, Sec'y.

SECRETARY BENNETT'S ACKNOWLEDGMENT.

The following letter from Mr. W. H. Bennett (Secretary to the English Committee having charge of the fund for the benefit of the family of the late F. W. Hartley) was received by us on date of March 1st. As it carries its own explanation, comment or extended reference to it is unnecessary; but we cannot forbear, speaking for those who responded to our appeal, to here formally thank the writer thereof for his fraternal recognition of the attempt made in the United States to honor the memory of a man who was worthy of all esteem.

22 GREAT GEORGE ST.,
WESTMINSTER, S. W.,
Feb. 16, 1886.

MESSRS. A. M. CALLENDER & CO.,

Dear Sirs:—I am in receipt of your favor containing draft for £61 11s. 6d., for which I enclose a formal receipt.

When the report and subscription list is issued I shall be happy to forward a copy to each of the gentlemen whose names you have given me as contributors to the fund. In the meantime, on behalf of the Committee, as well as my own, permit me to tender my most sincere thanks for the response the appeal has met with on your side of the Atlantic; and especially for the very kind, earnest and energetic manner in which you brought the subject before the profession in the United States. Such an exhibition of American sympathy I can assure you is highly appreciated by us. Yours truly,

W. H. BENNETT.

A WELL MERITED TRIBUTE.

In the early part of last February the ever-busy tongue of rumor had it that one of New York city's veteran practical gas men was about to retire from active duty; and the loud whisper of early February had risen to full-fledged assertion by the time the Providence meeting of the New England Association was enrolled on the list of things accomplished. Inquiry among those who were qualified to speak confirmed the reports; and we were right sorry to be finally convinced that Mr. Wm. Coombs, who had done such long and faithful service at the old 14th street station of the Manhattan Gas Light Company's works, had decided to sever his connection with the Consolidated Company. Not but he had fairly earned the ease consequent upon a retirement from active duty—none can gainsay that—still, the dropping out of one whose familiar face and cheery greeting can be dated back to '46 must cause regret to rise.

If those who called him friend and brother felt honest depression at his determination, that feeling was also more than shared by those who acknowledged his authority as their director; and they determined to mark his resignation of that directorship in a manner befitting the occasion. The secret of their intention was well kept, and its disclosure was effected at "high twelve" on Saturday, March 6th, because "high twelve" is the hour for "changing the gangs," and all the workmen were anxious to take part in the proceedings. Promptly at the hour appointed the "hands," with one accord, moved to the selected spot—the space in yard in front of the tower scrubbers. Between the scrubbers rested a pair of trestles sustaining a drawing board, on which reposed an elegant service of solid silver, most ornately hammered. The set consisted of a massive pitcher, goblet and tray, the elegant design and workmanship of which bespoke the poetry and cunning of the silversmith's craft. The field of the tray bore a strikingly truthful perspective view of the Fourteenth street station of the Consolidated Company.

When the last stroke of the gong had sounded the office door swung open, and in the entrance appeared the military figure of Gen. Chas. Roome, with Mr. Coombs in close company. The General had so managed it as to make an appointment with his aide, at that particular time and place, for the ostensible purpose of consulting him in regard to the sinking of a well on the station. The well in reality was sunk, and the drill hole revealed the current of esteem flowing within the breasts of those who had so long worked side by side with the retiring Superintendent. Possibly Mr. Coombs might have had a passing thought as to "tie-ups" and the like when he beheld the workmen ranged in file; but he did not have much time for reflection. General Roome, advancing towards the board and trestles, uncovered the glittering tokens; and, addressing the recipient, made the presentation on behalf of the workmen. The General, in his usual happy and felicitous style, spoke of the long and faithful service rendered to the company by Mr. Coombs. He touchingly alluded to the close intimacy and firm friendship that had always existed between himself and the recipient; and referred at length and feelingly to the niche occupied by Mr. Coombs in the respect and esteem of the men who served under him. This, the General said, was "only natural; for it was well known to all of them that Mr. Coombs, in performing his duties toward the company, had always had their best interests at heart; and ever stood ready to help, aid and assist them on any and all occasions."

Mr. Coombs (speaking with every evidence of lively emotion) replied briefly. He thanked the men for their beautiful present, saying, "It was one he would ever treasure, not so much on account of its intrinsic value, but rather as a token of the feeling which had prompted them to their action."

This compliment to Mr. Coombs was well deserved; and those who know that gentleman will endorse to the letter that opinion. His long connection with the company has fairly entitled him to its gratitude—which is unstintedly and unrestrainedly bestowed; and we are more than pleased to chronicle the hearty and spontaneous recognition of his straightforward course by those who for such a length of time had served under his immediate charge. Mr. Coombs first entered the service of the old Manhattan Company in 1846; and in 1854 became Superintendent of its 14th street station, a connection which was only terminated by his voluntary resignation on the 1st inst.

OBITUARY.—JESSE W. STARR.

With the decease of Mr. Jesse W. Starr, who died at his late home in Camden, N. J., on date of Saturday, Feb. 27, a busy life has been blotted out; and with its chronicling many memories are sure to be revived in the minds of those who remember the early prosperous days of that huge hive of industry—the Camden Iron Works. The subject of this brief memoir was one of the sons of Moses Starr, who was himself identified with the iron manufacturing industry. In fact the boiler work turned out from the establishment of Moses Starr—it was located in Philadelphia, Pa.—then enjoyed a national reputation. The deceased was born in Philadelphia in 1809, and was initiated into the mysteries and craft of the iron worker in his father's Quaker City shops. Shortly after attaining his majority young Jesse became a partner in the parental establishment and business, that connection being maintained until the father's death.

In 1848 Jesse and his youngest brother (Mr. John F. Starr) formed a partnership under the firm name of J. W. & J. F. Starr, which resulted in the foundation of the Camden Iron Works. The hour for pushing the construction of gas works enterprises in this country had arrived; and, seizing the opportunity, the brothers rapidly acquired fame and fortune through the multiplicity of contracts that were awarded them from different sections of the country. It would be impossible to name the different gas plants either partially or wholly erected by them; and such recital here would have little value other than that of a historic nature.

The first telescopic gasholder ever built in this country was made by them to the order of the New York Gas Light Company (in 1848, we believe), and subsequently (1850–2) they planned and erected the extensive plant additions needed by that company in those years. Among their other initial ventures may be noted the construction of the New Brunswick (N. J.) works—1851 2; and the Norfolk (Va.) works, which latter to-day celebrate the 33d anniversary of their completion. It may be said, in fine, that almost all of the older gas plants of this country were operated on, in one way or another, by the proprietors of the Camden Iron Works.

In 1864 Mr. John F. Starr was elected to Congress on the Republican ticket. He served two terms, and while in Washington had no connection whatever with the firm of J. W. & J. F. Starr—the reasons for such severance being obvious.* Deceased was a conservative business man; and in his opulent days was noted for his free-handed charity. Of his family (originally ten in number), two sons and one daughter survive him.

OBITUARY—JAMES DWIGHT BREWER.

Last February we were called upon to state the fact of the death of Mr. James Dwight Brewer, the father of the Springfield (Mass.) Gas Light Company, and we here supplement that statement by a few facts concerning his life.

Premising these with the remark that Mr. Dwight's death occurred on Feb. 7th, the record reveals that he was born on April 24th, 1819, at Thompsonville, Conn. His parents were natives of Springfield; but at the time noted were on a visit to the above named town. Having gained his 15th year, the young man went to Northampton, Mass., at which place he devoted himself to unraveling the mysteries of the hardware trade; and two years later he visited Columbus, Ohio—then in the "Far West"—making the journey by means of saddle and canal boat routes. He remained one year at Columbus; then "clerked it" for two years in New York city, returning to Springfield at the age of 21, fully equipped to enter partnership with his father. Brewer & Son's Springfield hardware shops were known in every Eastern section, and deceased's connection with the house was kept up until 1872. Many of Springfield's earliest business enterprises are honorably associated with the name of Brewer—banks, institutions (manufacturing and otherwise) and charities all bear witness to his zeal and watchful trustworthiness. He saw the charming village in which he was reared advance to the rank of a populous and wealthy city, happily without losing an iota of its former beauty. But notwithstanding the variety of enterprises which claimed him either as owner, patron or servant, the particular pet of his business life was the Springfield Gas Light Company. He procured its charter in 1847, and has been in its service ever since. (For details of his connection with that company see JOURNAL, Feb. 16, '85, p. 102.) Mr. Brewer was a faithful member of Christ Church, Springfield, and was a communicant thereof from the time of its foundation up to the hour of his death.

He also assumed, at various periods in the history of that congregation, the duties of treasurer, vestryman, and junior warden. In 1843 he was united in marriage to Miss Sarah Porter. The issue consisted of six children, four of whom died in manhood. A son and daughter survive. Honesty and zeal marked his business doings; love and prudence were the scepters that swayed his home circle. What greater tributes than these can we bring to the bier of the dead?

PERSONAL.—Mr. Jno. S. Levis, for many years connected with the Gilbert & Barker Manufacturing Company, of this city, has opened an office at No. 12 Platt street. Those in search of gas machines of approved design, as well as parties desirous of purchasing gasoline, naphtha, or other oils, will make no mistake in corresponding with him He is a thoroughly reliable man. We suppose it is pretty generally understood by this time that the Gilbert & Barker Company now forms a part of the Standard oil combination.

* In fact, J. F. Starr never afterwards resumed partnership in the firm.

[Official Report—Continued from page 127.]

Sixteenth Annual Meeting of the New England Association of Gas Engineers.

Held at the Narragansett Hotel, Providence, R. I., Feb. 17 and 18.

First Day—Morning Session—Feb. 17.

Discussion on Mr. Prichard's Paper on Fuel Gas.*

Having finished the reading of his paper, Mr. Prichard prefaced the discussion by explaining that he had in his possession complete copies of the reports from the gentleman who conducted the tests; and also had the indicator cards, data, etc., attached thereto. All of these might be inspected by anyone desirous of looking over them. The following discussion then ensued:

The President—I think we have listened to a very interesting paper; and I trust that it will not be allowed to pass without a contribution from every one here present who has any facts connected with the subject. I would like to ask Mr. Prichard what became of the experiments conducted at Lynn, with regard to the use of fuel gas with an incandescent burner, which I think the most of us went to see. Did the experiments entirely fail; or are they still carried on—either there, or elsewhere?

Mr. Prichard—I am not aware that any actual figures could be obtained; but I understood from those connected with the affair at the time that it was practically demonstrated to be too expensive. Nothing was done with it. They still have the burners in the Lynn office; but I failed to observe them elsewhere.

The President—Is the expense so great, on account of the construction of the burner?

Mr. Prichard—On account of the large amount of gas they use, as well. A large amount of gas is required to produce ten candle power—I think the statement was ten feet; but am not positive as to the quantity.

Mr. Harbison—I think we may feel greatly encouraged by Mr. Prichard's paper. I do not think the conclusions to be drawn from it are at all discouraging to coal gas men. I believe new fields of usefulness are opening up for our product that will be of even greater extent than those allotted to illuminating purposes. Speaking for myself, I have no doubt as to the correctness of the figures given by Mr. Prichard as to the heating capacity of fuel and illuminating gases. It is known to some of the members of the Association that two or three years ago an effort was made in our city of Hartford to procure an amendment to the charter of the local steam heating company by which its proprietors were to be authorized to go into the business of supplying fuel gas; and, in order to more thoroughly assist them in their efforts to obtain that Legislative sanction, we tried to get some information that might be of value to them in the presentation of their case before the committee. To that end, we kindly sent up to our friends in Lynn, and they very kindly obtained a pretty good sized bag full of fuel gas, and sent it to us at Hartford. We put the bag and its contents into the hands of a chemist, and set two new meters for the purpose of making separate measurements of the fuel and illuminating gas, the latter being of the quality we had been accustomed to make in Hartford. The tests for heating capacity proved (as has been stated by Mr. Prichard) that the total heat units developed per cubic foot of illuminating gas exceeded those developed from an equal quantity of fuel gas by 250 per cent. As the complete combustion of one cubic foot of coal gas takes nearly seven cubic feet of air, a dilution of our illuminating gas to the proper point showed that the diluted volume cost but about fifteen per cent. of our regular selling price for illuminating gas. As we were then selling at $1.80 per thousand, it would make the volume of the mixture cost twenty-three cents as against the fifty cents which the fuel gas men claimed was their minimum selling price. In other words, twenty-three cents worth of coal gas mixed with air would give two and a half times the heat units that fifty cents worth of fuel gas would give. We had that verified by our State Chemist. The result was, the would-be gaseous fuel suppliers very wisely decided to withdraw their application, and save their money—money which it would have cost them to fee an attorney, with perhaps some little incidental lobby expenses, and all that sort of thing, which gentlemen having business before Legislatures are calculated to know something about. We have heard nothing more about fuel gas since that time. As the selling price of illuminating gas is from time to time reduced, the difference between the value of that used for mechanical uses and fuel gas becomes still greater. I believe that companies making and selling fuel gas claim they cannot pay expenses and sell it at less than fifty cents per thousand feet—to say nothing of dividends; and I am not aware that any of them have enriched their stockholders with dividends up to this time, or that there is much better prospect for them (the stockholders) in the future. Some experiments are about to be made in our city which will, perhaps, tend still further to show that illuminating gas can be used to good advantage for mechanical purposes in blacksmiths' forges. At our next meeting I trust to have information upon that point which may be of some value to the Association. Experiments are about to be made at Colt's Armory, where they are now getting one of their furnaces ready, and we are disposed to furnish them all the gas they want, at our present low rates, in order to assist them in their work. They anticipate very satisfactory results from the experiments; and I need hardly add I trust that their expectations will be fully realized.

Mr. Learned—I would like to ask Mr. Prichard how the calorific power of eighteen candle water gas would compare with coal gas of equal lighting value.

Mr. Prichard—I do not think there is much difference.

Mr. Learned—It did not seem to me quite clear whether you were speaking of the illuminants of water gas, or fuel gas.

Mr. Prichard—I meant to have it understood that I was dealing with fuel gas entirely. The case is different with illuminating water gas, because that contains a larger amount of illuminants than fuel gas, and thus the heating power of the former is brought nearly up to that of coal gas.

Mr. Nettleton—I am under very great obligation to Mr. Prichard, first, for responding so kindly to my request for a paper; and next, for giving the facts in relation to the value of water gas as fuel. I presume that most of us have (certainly I have) had representations made to the effect that the way to make money easily was to put up another set of apparatus, and lay another set of mains, and make and distribute fuel gas. I think Mr. Prichard's paper settles the fact beyond all question that there is no money in it—either for the person who puts up the apparatus, or for the consumer who proposes to use the fuel. Fuel gas cannot be sold at a price that will bring a sufficient income to cover expenses. Further than that, he confirms me in the belief (which I have been gradually coming to) that we cannot hope to sell coal gas to a large extent—for purposes outside of lighting—at anywhere near present prices. Some years ago I devoted considerable time to the subject of gas engines, and my company spent considerable money in introducing them. Among others a twenty-five horse power engine was set up. It was one of the greatest mistakes that we have made. With gas at $2 per thousand it is utterly impossible to expect anyone to use an engine of that power, and pay the bills. It cost, when using full power, and running ten hours, nearly ten dollars per day. In order to use gas in an engine of that size it must be sold at one dollar per thousand at most. I question very much if it is policy for any one of us to try to introduce engines larger than seven-horse power—if they are to be used ten hours a day. If they are to be used intermittingly, then of course gas is the cheapest power known. We cannot hope in our day for any larger increase in consumption, outside of that required for light, for the intermittent use of gas for power, for small heats in factories, and for cooking; but I question very much if that demand from all these sources will ever grow to the proportions of the demand at the present time for lighting purposes.

Mr. Taber—I take exception to that last statement. At some time or another we are going to sell gas cheaply. They are selling it across the ocean in some places at 60 cents per thousand; and we have got to come to it. Those of us who came home from the Cincinnati meeting of the American Association, by way of the natural gas region, got an idea—or at least we got a hint—that we had better endeavor to make a gas that could be sold at a low rate for general purposes. This matter of using gas for fuel and for heat is, at our present rates, an impossibility, except intermittingly; but, sooner or later, we must come down to a figure at which it will be possible and practicable. I am looking forward to the time when we shall be able to do it. The question in my mind with regard to Mr. Prichard's paper was simply, whether we should be able to attain the end of cheap gas for fuel and for heat, without illuminants, by using water gas; or, how is it to come? In what way are we to take the step that is going to be forced upon us sooner or later? We have had our own way so far; we have charged as low as possible consistent with the payment of proper dividends, and the expenses attendant upon enlargement of works and extension of mains; but we are not always to have our own way. As was hinted in the address of our President, we have abundance of competitors now on hand. In what way, then, are we going to cheapen our product? I conceived a hope (although I am very glad of the assurance that we are now on the right track, and am personally very much obliged to Mr. Prichard for his paper) that this discussion might elucidate some way by which we, as coal gas men, might bring the price of gas down to where it can be used practically for other purposes than illumination. The extent of our illumination field is good; but we have got to discover a larger outlet for our product than that possessed by us to-day. I am sorry to hear that a 25-horse power gas engine is not a practical economical success at the present time. The question now with us is, how to make it a success, because we all know that the greater our sales the cheaper will we be enabled to sell our product. I hope the Association will think the matter up, and bestow such a plenty of

* For paper, see issue March 2, pp. 125-6-7.

thought upon it that the grand result will be a knowledge of how to increase the use and cheapen the cost of gas for purposes other than illumination.

Mr. Harbison—I trust the Association will not get a wrong impression from what Mr. Nettleton said. I do not think he meant to have the Association understand that, in his opinion, a 25-horse power gas engine was not a success—at a certain price for gas. I apprehend that his doleful view was based upon a selling price for gas of $2 per thousand. Indeed, he further expressed the opinion that, at $1 per thousand, it would be a success. I think we have reason to take great encouragement from that statement. I believe those of us who are alive five years from now will be able to sell illuminating gas at $1 per thousand as the maximum price. Remember, to do that we will not have to lower our prices within the next five years to a greater extent than we did during the past five. I believe, within five years from this time, gentlemen will be at the meetings of our Association who will represent companies then selling illuminating gas at $1 per thousand cubic feet, for any and all purposes, and still be making a fair dividend on a fair investment. I feel greatly encouraged in regard thereto. If a 25-horse power gas engine can be operated (with profit to the party using it) on the basis of $1 per thousand for gas, then I submit there is quite a field for the use of gas in that direction alone, to say nothing about many other departments of mechanical use. As matter of fact, my feeling in the premises savors not of dejection. The outlook favors elation. I know the experience Mr. Nettleton has had in using gas engines. With the smaller sizes of engines the use of gas is a success; and as the selling rates for gas are decreased, the sizes of motors in which it may be economically employed will also increase. As the demand increases, and improved means of making gas are devised—such as have been put in during the past five years—the prime price of gas will come down so that we can afford to sell at a lower rate. The larger the sales the lower we can afford to sell our product and pay a proper dividend to our stockholders.

The President—I agree with the last speaker, in the main; though I rather question some of the things he has said. On the whole, it encourages me to learn that gas, at $1 per thousand, can compete with steam, for a continuously running gas engine. That is what I understand Mr. Nettleton to say.

Mr. Nettleton—For size not larger than 25-horse power engines.

The President—I have been under the impression, up to this time, that although there was a considerable use for gas as fuel in running engines, yet that its value was almost wholly confined to intermittent power. I had not known before that, with gas at $1 per thousand, we could compete with steam in running engines continuously. Of course, that must be dependent to some extent upon the cost of the coal with which we have to compete. It is still a question whether, in a seaboard town, we should not have to sell gas at less than $1 per thousand before we could compete with the steam engine, when the engine was to be used permanently and without intermission. There is a market for gas to be used as fuel, if it can be furnished at the right price—just as there is for the electric light. Gas is used to quite a large extent in the classes of engines which we now have; but I think it will be used much more if an engine which has just been brought to this country proves to be a success. An engine has just been brought to Boston, to which my attention has been called, which is, as I understand, the only gas engine now made which is not affected by the Otto patents, and can be made much more cheaply than the Otto engine. It has been brought over to this country for the purpose of determining its value; and I am advised that it has fallen into the hands of people who can push it properly. If that engine will do what is claimed for it, we shall all be able to sell more gas for purposes of that kind. But as to selling gas to compete largely with steam for power, I do not believe it is going to be a possible thing to do. Gas can be used also in various other ways. There has been, I believe, a gas furnace put up in Boston for burning porcelain, by which a better heat can be got, and the heats more evenly regulated than in any other way. Mr. Taber has alluded to another way in which the business can be pushed. I presume that your attention has been called to the fact that there are a number of small companies scattered throughout Europe, and especially throughout Sweden, which have different prices for gas at different times in the 24 hours. From daylight to dark they sell gas at one price, and from dark to daylight they sell it at a different price. In that way they have materially built up the amount of gas which was sold for purposes other than for illumination. Of course, it can be very properly urged against the Swedish plan that a man who uses gas for the purpose of illumination has fair ground for complaint that he is discriminated against in favor of the man who simply uses half the quantity he does, and who only uses it to cook his dinner. I think the general feeling with regard to that matter, by men who have given it attention, has been that it is hardly a fair thing to do; and that the com anies ought rather to endeavor to reduce the price all around than reduce it to a special class of customers. I think a set of experiments were made a few years ago, by Mr. Rowland, of Greenpoint, N. Y., with regard to the comparative value of heating gases—and not only simple fuel gas, but of the different illuminating gases. According to the best of my recollection (and I hope to be corrected if I am in error) the value of those gases for heating purposes was almost directly in proportion to their illuminating power. And that was true whether it was coal gas or water gas; and whether of ten, twenty, or thirty-candle power. His results coincided with those of Mr. Prichard, and it certainly looks as if there were no profit whatever in the business of selling fuel gas.

On motion of Mr. Harbison, the thanks of the Association were tendered to Mr. Prichard.

The President announced that the next paper to be read was on a kindred subject to that submitted by Mr. Prichard, and was the contribution of Mr. J. H. Rollins, of Worcester, Mass. Mr. Rollins thereupon read the following paper entitled—

EXPERIENCE IN THE MANUFACTURE OF WATER GAS.

Gentlemen of the New England Association of Gas Engineers:—At the request of our worthy Secretary, I have reluctantly prepared a few figures giving you my experience in the manufacture of water gas at the works of the Worcester (Mass.) Gas Light Company, in the year 1885.

After quite an amount of investigation, I advised my Board of Directors to put up a small plant for the manufacture of water gas. At the same meeting of the Board I was instructed to look up the different water gas processes, or as many of them as I thought necessary for the requisite determination. This was done, and a report made to them. In several of my visits I had the good fortune to have the company and advice of our good friend, F. C. Sherman, of New Haven, Conn., prosecuting his travels for the same purpose as myself.

My report to my Directors gave them two processes to choose from, and, for what seemed to them good and sufficient reasons, they decided on selecting what is known as the Granger Process. A contract was soon made with A. O. Granger & Co., for two sets of their apparatus. This apparatus consists of two generators, two superheaters, two washers, one condenser, two naphtha pumps, blower engines, boiler, vaporizing tank, naphtha tank, gauges, etc.

The works commenced to make water gas on January 29, 1885, at 1 P.M., and a total of 37,000 cubic feet of the gas was made that day. During the remainder of the year we have made such amount as was needed to meet the demands for gas, but always in connection with our coal works. The gases have been mixed either in the purifiers or in the holders. For a short time, when rebuilding the coal gas benches, we were obliged to make a large part of our gas in the water gas apparatus. For these reasons the quantities of water gas made have been very irregular, and so have varied greatly, running from 10,000 to 215,000 cubic feet per day.

We were greatly troubled to get the right kind of coal, and, for the first few months, used more than would have been sufficient for the purpose when working with the most desirable qualities. With these explanations, I will give you the result of our operations from January 29, 1885, to January, 1886.

Amount of gas manufactured, 12,452,100 cubic feet; weight of Lehigh coal, per thousand (average) 48.2 lbs.; gallons of naphtha, per thousand, (average) 4.6; coke for steam boiler, about ¼ bushel per thousand. In our year's work the cost for coke has been a little less than that conveyed by the statement of ¼ bushel. We have valued the coke at 10 cents per bushel, and the cost of same has been .016 per thousand feet of gas, and this can be made still less by screening the ashes from the generator, and using the coal cinders thus obtained under the boiler. With two generators in use, nearly enough cinder would come from them to generate the steam; but the screening of the ashes costs nearly as much as the fuel is worth.

I am not able to tell exactly the cost of purification, but think it will not differ much from that of coal gas—good coal being used in both cases. The cost of labor will depend on the kind of men employed. The services of two men will be required in the manufacture of 100,000 feet per day. If several hundred thousand feet were to be made per day, the expense would be less. The illuminating quality of the gas is all that could be desired, but the exact candle power I cannot give—except in a few cases when no coal gas was being made.

These tests show on inlet to holder as below; also the quantity made, and material used.

No. 1.—Gas made		84,000 cu. ft.
	Coal per thousand	44.7 lbs.
	Naphtha "	4.3 gals.
	Candle power (bar) two tests—average	19.5
	" " (power meter) 62 tests "	19.3
No. 2.—Gas made		85,000 cu. ft.
	Coal per thousand	47 lbs.
	Naphtha "	4.2 gals.
	Candle power (bar)	19.5
	" " (power meter) 47 tests—average	20.2

No. 3.—Gas made.....95,000 cu. ft.
Coal per thousand.....44.3 lbs.
Naphtha " .....4.7 gals.
Candle power (bar).....20
" " (power meter) 91 tests—average.....21.3
The above does not include steam fuel.

No. 4.—Gas made.....78,000 cu. ft.
Coal per thousand.....45.9 lbs.
Naphtha.....4.6 gals.
Candle power (bar).....19.7
Candle power (power meter) 86 tests, average.....22.2
Coke for boiler 16 bushels, and 400 lbs. screenings.

In the following experiment both sets were making gas from 8 A.M. to 6 P.M., and one set from 6 P.M. to 1 A.M. The amount of gas made with both sets in operation varied from 17,000 to 18,900 cubic feet per hour. With one set from 9,100 to 12,300 cubic feet per hour.

No. 5.—Gas made.....215,000 cu. ft.
Coal per thousand.....55.2 lbs.
Naphtha.....4.05 gals.
Candle power; inlet tests ran from.....18 to 21.55
Candle power; outlet tests ran from.....17.6 to 19.36
Average candle power (bar photometer) 5 tests on inlet 19.68
Average candle power (bar photometer) 13 tests on outlet 18.68

The coal used was too soft, and carried quite a large quantity of slate in it. By using the screenings from generator mixed with coal, we have made gas at an expenditure of 30 lbs. of coal per thousand.

From our experience thus far I think we can make our gas per thousand with 45 pounds of coal, adding one-sixth bushel of coke on steam account. The amount of naphtha will be governed by the candle power of the gas and the quantity and quality of the coal gas employed—if a mixture is to be made of a specified illuminating value.

All experiments, as to quantity of material used and gas produced (also candle power), give the exact results of our work, as no coal gas was being made at the time. In our work for the year the coal gas has had equal credit for the same yield per pound of coal, whether we were making water gas or not. The water gas has credit for the balance. More of the above tests or experiments could be given; but the above furnishes about a fair statement. The analysis of Dr. G. E. Moore (made at our works) I have no doubt affords a fair statement as to components. His figures are—

Nitrogen	2.64
Carbonic acid	0.14
Oxygen	0.06
Heavy hydrocarbons	12.82
Carbonic oxide	28.26
Marsh gas	18.88
Hydrogen	37.20

It may be of interest to some of the gentlemen who have difficulty in selling their surplus coke at a fair price to know that in the manufacture of water gas they can dispose of it. We have recently made some experiments in substituting it for coal in our generators, and find that we can make as good or better gas from the coke than we did from the coal. We can make our gas from one bushel of coke per thousand cubic feet, and up to the present time have done a little better than that. However, I feel safe in saying that we can produce it out of one bushel per thousand. In using coke the generator must be filled oftener, making more work for the men, and a trifle less gas per hour is obtained. I am also satisfied that we get a better light from the mixture of the coal and water gases than we can from either sort when burned as made, or without admixture. The best proportion for that mixture I am not now prepared to state.

In conclusion I will say that the apparatus has met my expectations. It is very simple and easily operated. We have never seen a trace of naphthaline in or out of the works while we have been using it, and have not had a stoppage of any kind in the apparatus. The very small quantity of tar produced is not worth mentioning. No stopped standpipes or pitch in hydraulic main to look after. The works may be in full operation at 6 P.M., and by the time the men get washed they can safely lock the doors and go home. They can return in the morning and in 20 to 30 minutes be making gas. Let the works remain idle for weeks, and in two hours' time they can be sending out gas, while in four hours they will be in as good condition for gas making as though they had been used constantly. The great and insurmountable objection at present is the carbonic oxide contained in this gas.

While water gas is not young in chemistry, it is comparatively so in practical use; and until some of our inventors or experimentors find some way of removing the obnoxious element CO, without injury to the gas, we should be careful not to send out enough of it to endanger the lives of our patrons. The law of the State of Massachusetts fixes that limit at 10 per cent.

The question may be asked as to why we put in a water gas plant, and were at the same time making arrangements to rebuild our coal gas benches. The answer is, that with the amount of gas that we were making we had more coke and tar than we could dispose of at a fair price as compared with the cost of other fuel. Our tar tanks were full to overflowing every winter, and we were obliged to burn it in place of coke. While we had a surplus of coke without burning tar, this made our coke piles still larger, and we must dispose of it at some price. If we could make our gas in part by some other process, and by so doing have less coke and tar, and at the same time not make the gas cost us more, we might make it cost less by getting a better price for the coke and tar we had to sell. If we can make coal gas and burn all our tar, and make water gas from our coke, we shall then be in the gas business, and not be dealers in gas, coke and tar. If we can do this and also give our customers a more satisfactory light we shall be satisfied. We have a plant large enough to supply all the gas needed in Worcester for many future years, and this we propose to do.

We propose also to give our customers a good gas at as low a price as any one else can; also to give them any kind they want, or that could be furnished by others. We think we can do so now.

Discussion.

The President—That is the kind of paper we want at the meetings of this Association. Mr. Rollins has been telling us practically just what I said I thought could be done to develop a more ready sale for coke and coal tar. I would like to ask Mr. Rollins one or two practical questions. First, I would like to know whether he has worked his generator strictly in connection with his coal gas apparatus without the intermission of any governor of any kind; and, if so, whether he has found any inconvenience from increase of pressure, or whether he has governed it in any way.

Mr. Rollins—We have used it in connection with the coal gas—making both gases at the same time—but, of course, using only one generator. Our gases are mixed just back of the purifiers. We have had no trouble with regard to back pressure, and no difficulty with the exhauster. The governor takes care of that—an ordinary exhaust governor.

The President—You must speed up your exhauster a little, I should suppose.

Mr. Rollins—You will find very little difference between the times of making the gas and then stopping off. You would scarcely notice the difference on the gauges.

The President—What effect will it have on the seal of the purifiers?

Mr. Rollins—I cannot see any effect at all. We have large sized purifiers. The purifiers are larger, perhaps, than are needed.

The President—Do not the gases come forward from the generator with great pressure?

Mr. Rollins—From six to eight inches—according to the speed of production.

The President—There is another question I would like to ask which has a direct bearing on a point at the State House. Mr. Granger has claimed that from 3¾ gallons of naphtha he could make 23-candle gas. That does not coincide with your experiments.

Mr. Rollins—I do not think so. I think that 4½ gallons, on an average, is the best figure that can be attained in the manufacture of a 20-candle gas. Such, at least, is the result of my experience.

The President—I would like to ask Mr. Prichard if he will give the Association his experience in this matter.

Mr. Prichard—We have erected a single set equal in size to that at Worcester, and have used it. We have been careful not to exceed the law in any way—that is, not to allow the mixture at any time to contain more than 10 per cent. of CO. We have also incidentally operated it at times when our holders were low. We had been rather short of holder room this winter, and (Lynn being a manufacturing town) before 6 o'clock on dark evenings we would be driven hard for gas. On such occasions we have used our water gas apparatus to great advantage. We use it as an enricher rather than anything else. Our results agree substantially with those of Mr. Rollins. He has obtained better work, because he has run more continuously. I have had only one stoppage, but on that occasion the pressure ran up to three feet. The gauge having stopped at that figure, I cannot say how great the maximum pressure was. It was high enough, at any rate.

The President—What do you say about the quantity of naphtha?

Mr. Prichard—I should say about 4½ gallons for the production of a 20-candle light. It appears that when we mix small amounts (even less than one-fifth) of water gas of 18-candle power with coal gas of 17-candle power that the mixture has an illuminating value of 18 candles. The mixture of the two seems to give a somewhat higher candle power than you could obtain from either gas separately.

The President—Then each gas is benefited by being mixed with the other.

Mr. Prichard—It seems so.

Mr. Rollins—I have not been able to determine the point exactly, although I have made experiments with a view to ascertain what were the best proportions to employ in making the mixture. I have noticed the same thing, with regard to candle power, just spoken of by Mr. Prichard. The mixture gives an increase in candle power; but just how the quantities should be mingled depends, I think, upon an analysis of the coal and water gases which are to contribute the mixture.

Mr. Harbison—I underst nd Mr. Rollins' paper contains an allusion to the fact that he had no choked stand-pipes in connection with his water gas operations. I would like to ask him how the making of water gas in a separate apparatus, and then mixing the gases at the exhauster, can affect the stand-pipes of the main. Or does he mean us to understand that it had no effect?

Mr. Rollins—I meant to say that in our water gas apparatus there is no hydraulic main or stand-pipes to give trouble.

Mr. Nettleton—I understand that Mr. Prichard has been able, by means of water gas, to send out a very large quantity of gas from a small holder. I would like him to give a statement of what he did.

Mr. Prichard—It has been said recently that, our sendout being so irregular, we could not have got along unless we had had a water gas apparatus. We could and should have managed it even if we had only the coal gas benches; nevertheless, having the water gas we used it to great advantage, and on occasions sent out nearly double our holder capacity with no extra fires. It seems to me that in the future we have got to pay more attention to the quality of our light. We have paid great attention in the last few years to the analysis of gas, and we have attempted to regulate its composition; but we have made no attempt to produce a light any different in quality from such as we happened to hit upon by the destructive distillation of coal. Whether or not that is the best possible light is a question to my mind. It seems to me that the nearer we get to the sunlight the nearer are we to producing the most desirable light. With coal gas we certainly do not approach very near to the sunlight. The spectrum from coal gas differs entirely from that from sunlight. In the light of coal gas colors do not appear to us to be the same as they do in the sunlight. Neither do they with the arc light. The electric light is almost as much toward the violet end of the spectrum as gaslight is toward the red end. In the midst of improvements in lights of all kinds a proper time has come when we should devote more attention to improving the quality of our light. If water gas is the essential element to introduce in order to produce the most perfect light, it is time we devoted some attention to it. If some other element is needed, we wish to know what it is. The light we furnish, even with a very small percentage of water gas, is a very handsome one. The whole character of the light seems to be changed. We are all anxious to produce the best possible light we can; and I would like to hear from one who has made experiments, and who will give us his experience in this respect.

Mr. Harbison—In Mr. Prichard's opinion, can the same results now secured by him with the water gas mixture be obtained by the use of naphtha as an enricher of coal gas, to the complete exclusion of cannel coal? In other words, do you need to put up a water gas apparatus when, by the aid of naphtha as an enricher of coal gas, you might obtain practically the same results as those gained by enriching with water gas?

Mr. Prichard—I do not think you can. With the aid of naphtha you can produce a much better light; but I do not think the simple use of naphtha gives us the best possible light.

The President—Mr. Prichard's question is a very pertinent one. The effect which is produced by a small amount of water gas may be what we are all looking for, or it may not. In regard to what Mr. Harbison has just said—about the introduction of a naphtha enricher—I do not think that is the panacea. We have been using naphtha very largely this past year, but our gas still has a yellow flame. Now, in regard to the mixture of water gas with coal gas in small proportion, as far as you can see the only effect is to slightly increase the proportion of carbonic oxide present. That is apparently the chief change shown by analysis. It is possible that that small amount is of value; but there is certainly a limit to which that carbonic oxide favors the development of illuminating power. There have been some very curious experiments made this year by Mr. Hinman (our Massachusetts State Gas Inspector) on the illuminating power of various gases; and he calls attention to the much larger amount of illuminants that are necessary to produce a given candle power in water gas than in coal gas. He says that 12 per cent. of illuminants burned in water gas will not give by any means double the light that 6 per cent. of illuminants in coal gas will give; that they are substantially the same thing. Beyond a certain percentage of carbonic oxide in gas, its presence seems to detract from the illuminating power of the gas rather than to assist it. That was one of the results of his experiments. If that is so it seems curious that a small amount may be a benefit; and yet what Mr. Prichard has said about the mixing of the two gases, and using no more oil to make water gas than he would put in as an enricher for coal gas, and yet have a benefit from mixing the product, is a curious thing. I am inclined to think it is founded on fact. I do not think experiments have been carried as yet very far in that direction, or to the point to which it is necessary for them to be carried before we can find out just what we are going to arrive at as the perfection of illuminating gas.

Mr. Stiness—I would like to ask whether the whiteness of a light is any more pleasant to the eye than is its diffusion. If you take the arc or incandescent lights you will notice that the rays are not diffused over a plane equal in extent to that which will be covered by coal gas lights of equal candle power.

The President—I should say that diffusion does not depend upon color alone, but rather upon the size of the flame in each case; or, that 18-candle water gas might diffuse as well as 18-candle coal gas. I do not believe in high candle power gases, in either case. The same thing can be seen in the effect produced upon the eye by the incandescent burners in this hotel. Last evening I found them distinctly offensive to the retina of the eye. The light was disseminated over altogether too small a surface. It was a very bright and intense light; but it was unpleasant to my eye. So is one of these small jets of 30-candle power water gas. I do not think that, for domestic purposes, or for ordinary practical purposes, lighting with it compares at all favorably with 18 or 20-candle power coal gas. I do not believe that the gas of the future, or which is to be the gas which the people are to use and be satisfied with, is going to exceed 20 candles in power. I do not think that the people want those small, brilliant jets.

Mr. Sherman—In this connection, I would like to remark that our friends in the water gas business, as a general thing, exaggerate the candle power which they are furnishing to their customers. Along with other favors for which the Gas Inspector of Massachusetts has placed us under obligation, is a record of the candle power of water gas, as furnished in quite a number of cities in this State, and in western New York, if I remember rightly. That record shows they are not being served with a candle power in excess of that which we are now giving to our customers. I think in only a very few instances (in places which are being exclusively served with water gas) is the candle power found to be over eighteen. If our friends here think they are going to escape all trouble and anxiety, and that the Millennium has come with the introduction of water gas, they will find themselves mistaken. While I have had no experience in its manufacture, I have investigated the subject well enough to know that there are some "outs" under it; and that there will be no opportunity to fold our hands while we are making water gas. I have found places where they were using double the quantities of coal and naphtha that are "put down in the books," and which quantities have been represented to us here to-day as being the proper amounts to employ in its manufacture. The increased quantities are chargeable to the fact that the apparatus gets out of order—it becomes clogged up. That defect applies particularly in the superheater. The water gas system of light development is very far from being perfected at the present time. As I understand it no two water gases are ever made alike. They are continually experimenting on the superheater. The soot and tar going over with the gases from the generator form a coating on the filling which renders it impervious to heat; and, if that item is not looked after, in a very short time you will find that instead of getting up heat in 10 or 15 minutes, 45 minutes will be absorbed in "blowing up." Further, instead of making your gas with from 4 to 4½ gallons of naphtha, you will be using—as really came under my observation in on instance—7 gallons. All these things show that the water gas apparatus is not yet perfect. These remarks would also apply to illustrate the statement that we are not going to get on without our holders for the present. Water gas men represent to us that we will save holders by using their apparatus; but, as their apparatus is not yet perfected, I do not think we had better determine to dispense with our storage vessels just yet, or neglect the proper enlargement of them to meet our demands in the future. In fact, I think we shall yet need our holders for some little time.

Mr. Thomas—According to the Inspector's returns, the water gas supplied in New York city averages about 25 candles whilst the coal gas is rated at about 19 candles. Some of the members say they like to see a white light, such as water gas is supposed to give. I think an examination (based upon eyesight) of the different illuminating gases furnished in the city of New York would trouble the observer to say which was water or which was coal gas that developed the light the examiner was looking at—without he detected it from the burners that were employed. When water gas was introduced into the city of Brooklyn the claim was made that it would develop not less than 30-candle power. I have yet failed to find anyone who was better satisfied with the Brooklyn water gas than he formerly was with the 19-candle coal gas supplied him. It is stated, by the purveyors of water gas, that that article can be manufactured much more cheaply than coal gas can. I place no credit upon such a statement; and I fail to honor their drafts upon my confidence simply because I *know* of localities in which coal gas is manufactured at much less cost than water gas can be made for. The mere difference in cost, however, of a cent or two per thousand is an impotent argument, and furnishes no basis of justification, for the delivery of such

a poisonous compound. You seldom take up one of our city newspapers without being confronted by the account and recording of the death of some person who has succumbed to its insidious attack. These mortuary records, in so far as they apply to the city of New York alone, enroll the deaths of over 100 persons; while similar statistics embracing other American cities reveal an equal ratio of like mortality. Were the companies supplying water gas compelled to pay "damages" for all these death cases, their margin of profit would be very small, and leave slight room for any claim of economy in the manufacture and distribution of an article that has proved so fatal in its effect.

On motion of Mr. Stiness, a vote of thanks was tendered to Mr. Rollins. The Association here took a recess, with the understanding that hour for re-assembling would be 3 P.M.

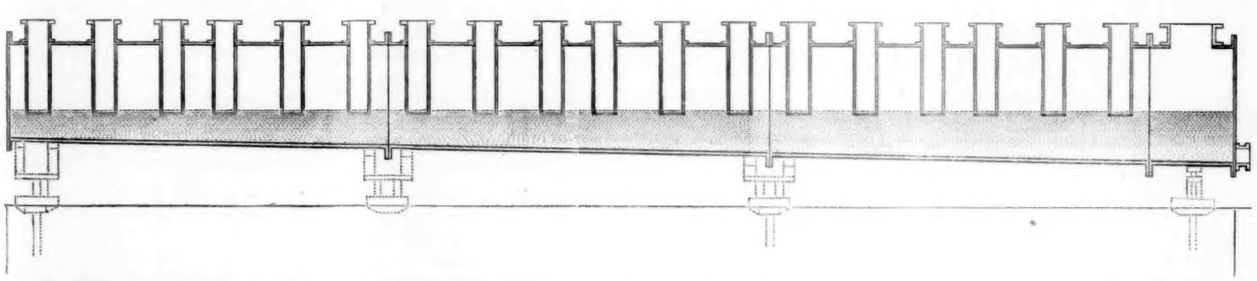
FIRST DAY—AFTERNOON SESSION.

At the hour above named Chairman Greenough sounded the call, "to order," and announced that Mr. S. G. Stiness, of Pawtucket, R. I., would read his paper on the subject of—

RESULTS IN THE USE OF A HYDRAULIC MAIN.

Gentlemen of the Association :—At our annual meeting in February, 1884, it was my privilege, in the paper* that I then presented, to call your attention to a plan of a hydraulic main. At that time I could only speak theoretically; to-day I speak from the standpoint of experience.

From the earliest days of gas making the hydraulic main has been an important factor in the details of our manufacturing operation. Many devices have been presented, some novel in their character, and intended for a specific purpose; but all failed to accomplish the result so much desired, as they never departed from the original design of a horizontal main, and sought to accomplish the removal of the tar either by the sealed tar gate, or with the aid of manual labor. In the usual main and seal the water and thin oil pass off first, thus obliging the gas in its travel from the retorts to pass through the thick tar. The requisites of a perfect hydraulic main and connections are few, yet important. The stand and bridge-pipes should be of good size, and the dip-pipes of sufficient length to allow of only a light seal; ample area in the main for the easy flow of gas, and the removal of tar as deposited, allowing it to flow to tank always specially provided as the receptacle for it. The seal of a dip-pipe is only to prevent the flow of gas back when the lids are removed; and in these days of perfect exhauster governors the seal to dip-pipe is easily controlled.



Sufficient area for the flow of gas, united with the speedy removal of the tar—thus allowing the gas to pass through water only—and a free exit from the hydraulic main, are advantages that only require naming to be appreciated.

After a careful and continued examination of the matter I am fully convinced that the chief, if not the sole, cause of stopped stand, bridge, or dip-pipes lies within the hydraulic main; and in the plans of the hydraulic which I again present to you, I feel that I may claim to have successfully accomplished all that can be required in that direction.

The dimensions of a main must necessarily vary. In the main herewith presented one end is raised so far above the brickwork of the arches as to be removed from the influences of radiated heat—the space under the dip-pipe continually increasing to the end of main. The combined take-off and tar-pocket is beyond the line of arches. No heat interferes with the tar-pocket although nearer the brickwork than in many cases which I have seen.

By the use of an inclined main (a "pitched" main without any pitch) all of the tar, as soon as deposited, will, by a simple law of nature, find its way to the tar-pocket specially provided, from whence it is very easily removed; and the passing of the gas from the retorts through water only is the "*cure positive* for stopped stand-pipes." It must be plain to all that water (being less dense than tar) presents less resistance to the flow of gas; and consequently the gas is the more quickly passed into and through the hydraulic main, instead of being unnecessarily detained in the stand, bridge, or dip-pipes. As it is usually the thickest and densest portion of the tar which remains at bottom of main (for the water or light tar will always flow off first in the level main), in nearly all cases level mains are hydraulic mains in name only—tar mains, in fact. Therefore the advantages of a true hydraulic main are of marked importance and must be apparent to all, since a much larger yield of gas can be procured per pound of coal in the one case than in the other, thereby giving a larger yield per mouthpiece. Further, the free delivery of gas from the retorts in passing through water only, aids materially in gaining the much desired object of keeping them free from carbon.

In the days of 9,500 cubic feet of gas per ton of 2,240 lbs. of coal, or 5,000 cubic feet per retort per diem, or 12,000 to 15,000 cubic feet per one man's labor, the tranquility of a gas man's life was little disturbed. While we then had stopped stand-pipes, they were the exception and not the rule; but with the introduction of improved furnaces, high heats and large retorts, with 12,000 to 13,000 cubic feet of gas per ton, 60,000 to 70,000 cubic feet per bench of sixes, and 30,000 to 35,000 cubic feet for one man's labor (with the limit not yet reached), there came a change.

As suitable provision, in many cases, had not been made for the increased quantity of gas, and the increased density of the tar, we had pitch—"doubly distilled pitch;" and in our despair we cried, "From pitch, good Lord, deliver us!" For the old main and many projected improvements failed to accomplish what the increased production of gas demanded—that is, a free flow, without obstruction, and which can only be accomplished by a form of main calculated to remove the tar as fast as it is deposited, making it in fact what it is in name, a hydraulic main.

There is another important matter in connection with the construction of a hydraulic main. Never allow a luted plug to be used on stand, bridge, or dip-pipe. Whatever the material used, some of it will find its way into the pipes or main.

Allow me at this time to present a few figures in regard to our results for 1885. The quantity of gas made was 66,098,000 cubic feet; the weight of coal was 5,328 tons of Westmoreland; crude oil used was 5,000 gallons. That material furnished a yield (average) of 5.53 per pound; 9,980 cubic feet per retort; and 29,940 cubic feet per one man's labor, without taking into account missed charges or stoppage of any sort. The largest number of retorts in working was 35; the lowest, 6.

While I do not claim that the figures presented are attributable to the use of the inclined main, I am positive that without it the average would have been decidedly different. The result secured may be traced to the combined use of every improvement presented to my notice. And is it not well to carefully consider our duty in view of the fact that, within the past few years, many improvements (some marked in their character) have been presented to our view, and have received the stamp of approval?

The days of "we have got along well enough" have passed forever. Improvement in every detail of our manufacture must be sought after and adopted. It may be that the improvements of to-day will be superseded by those of to-morrow. If so, they also must be adopted. Strong, earnest, scientific minds are striving to solve the problem of a good artificial light, to be supplied for a small sum of money; and behind them stands unlimited capital—for merit will always command support. There are many gas works where no changes of importance have been made in almost a generation; and in others only a few.

Improvement is the demand of the hour; and gas companies having rights, which they claim are vested rights, should remember that the public also have rights which we are bound to respect. The unknown writer of a paper presented at our meeting in 1884 gave expression to these words: "It is for the best interests of gas companies to make good gas and sell it cheaply. Keep their customers contented and satisfied; see that they have no cause for complaint; and the danger of consumers seeking other means of illumination will be reduced to a minimum"—words true then, and equally true to-day.

It is a matter for congratulation that so many companies promptly and thoroughly appreciate the demands of the hour. And I "take heart of hope" in believing that the decimal problem presented a few years ago by our friend from Newport will soon be a reality (and not a beautiful word

*See JOURNAL, for March 17th, 1884, pp. 127-28.

painting) as he presented it. Let improvement be the watchword of the hour, and the problem will speedily be solved; for I fully believe that the panacea for all the ills of a gas company's life lies in that direction rather than under the shadow of the Commonwealth or behind the rampart of consolidated interest.

As "eternal vigilance is the price of liberty," so also is eternal vigilance the price of cheap gas—ever remembering that as the black diamond of the field is the more intelligently and scientifically treated, the more generous will be its return.

Continuing on, upon finishing the formal reading of his paper, Mr. Stiness (pointing to diagrams and plans) spoke as follows: The form of hydraulic main here shown is that applied to three benches. The other tracing shows a main inclined (from center point) to both ends of a series of benches. In this plan the depth under dip-pipes is continually increased from one end of the hydraulic to its other extreme, or take-off termination; just beyond which is located the tar pocket. This last feature is of marked importance, and was adopted as the result of practical investigation. The test which I apply to detect the possible presence of tar in the hydraulic is the following: I select the cleanest stick obtainable—not a piece that had been planed, but merely sawed, for the reason that tar adheres more readily to a rough surface than to a smooth one—remove the cap from the dip-pipe, and run the stick through to bottom of main. I assure you it is an utter impossibility, in the hydraulic main I am now using (and which has been in use since last August), to discover that a single particle of tar remains in the main beyond the time sufficient for it to flow down the incline to the tar pocket. Having reached the tar pocket, the deposit is removed (in the way here shown) and taken into this arrangement (showing a plan of "Hutchison take-off"), from whence it is immediately taken to the tar tank, which latter is the only receptacle where tar should be allowed to remain.

Discussion.

The President—We are all of us more or less familiar with the trouble spoken of by Mr. Stiness whenever we endeavor to get a large yield of gas per ton of coal; and if Mr. Stiness has shown us satisfactorily how we can avoid it we are certainly very much indebted to him. I trust that some of the gentlemen who have tried other means will give us the advantage of their experience, and that some gentleman who has tried this apparatus elsewhere will tell us how it worked. I understand that Mr. Rollins, of Worcester, has made some experiments with it.

Mr. Rollins—Last summer I put in two mains, on the Stiness plan, on work where I was running four benches of sixes on each main. I found no difficulty in keeping the main free from tar. We had some trouble from stopped stand-pipes; but, from subsequent experience, I think that that trouble should not be attributed to the main, since I had some stopped stand-pipes when the main contained nothing but water. I find, as probably you all have found, when working with different coals, that with one sort of coal stopped stand-pipes will occur, while none will happen from the use of the other sort.

Mr. Snow—Discussion as to the cause of stopped stand-pipes has always been of interest to me—interesting rather in the nature of a curiosity—because that experience is something we do not have at Holyoke, Mass. Our new retort house has been in operation since 1881, and during that time we have had but two cases of stopped stand-pipes. We never had to move the overhead plug, and have done neither boring nor drilling. Much of this discussion applies to the matter of pitch in the hydraulic main; and that is a thing I have never seen. I have been at Holyoke for over ten years, and do not know what pitch is.

Mr. Stiness—What is the yield per retort?

Mr. Snow—Last winter we ran our heats so as to burn off 1,600 pounds per bench every four hours, and have obtained a yield of 5.25 per pound. We have an individual main for each bench. The main is situated three feet above the top of the brickwork on top of the stack. This brickwork is cool enough to bear your hand on it. You can walk all over it without experiencing any inconvenience. The stand-pipes are 3½ inches away from the face of the bench.

Mr. Stiness—Did I understand you to say 1,600 pounds to the retort in a day?

Mr. Snow—1,600 pounds to a bench of sixes in four hours.

Mr. Stiness—Then your experience does not run up to charges of 2,300 to 2,400 pounds to a bench?

Mr. Snow—No, sir.

Mr. Stiness—I think that if Mr. Snow had worked 2,300 pounds to the bench (at heats sufficient to carbonize that weight of coal) he would find pitch, and double-distilled pitch. With 1,600 pounds I have never had any pitch. It all runs off as tar. Experience, the gas world over, has shown that where very high heats have been carried you do not have a fluid tar. It is the keeping of the tar in a fluid state, while working at extreme temperatures, that the inclined main principle is intended to accomplish. Then, again, Mr. Snow has independent benches, which plan permits of easy removal of the tar. I may say that in the days of dull heats we did not produce pitch, and could not.

Mr. Nettleton—It was my good fortune to visit Pawtucket, R. I., a few weeks ago, and then saw this main in operation. I must say, while I knew that Mr. Stiness thought very well of the main, I did not expect to find it working so admirably. I was most agreeably disappointed. As mentioned in his paper, one end of his retort house is fitted with the inclined main, the other end being operated under the old style. The heats in both cases are equal. One end of the establishment is plugged up with pitch and with stopped stand-pipes (if he will permit me to speak about his works), but at the other section the hydraulic main, stand-pipes, etc., are perfectly clean. I went up on top of the bench, taking a clean lath with me, and run it down to the bottom of the main. Except that a particle of discoloration was noticeable on the bottom of the stick, not a sign of tar could be found. I have been through this pitch business so often, and have taken it out of the mains so many times, that I am very glad to know there is a way of getting relief from it. I hope to be able, during the coming summer, to put this hydraulic main into my works. I believe it will be a cure for pitch, even if it does not increase the yield. The wonderful results which Mr. Stiness has given us do not allow for any stoppages for repairs, for scurfing retorts, or for full holders. Without allowing an hour, or a minute, for such stoppages, he has produced 9,980 feet per day for a year of 365 days. I question if that result is equaled anywhere else in the United States, outside of Rhode Island.

Mr. Stiness—I would like to state that during the months of May, June and July I ran but one bench of sixes. Therefore you perceive that in those months I am not able to secure the average yield per retort which can be accomplished sometimes in October and November, and in the early part of December. We are located in a very large manufacturing town (last week our consumption varied from 220 to 390 thousand per diem, and in the winter season the figures will range between 330 to 480 thousand), and are obliged, during the latter portion of December and the early portion of January, to keep one fire constantly in working order; although many times we are compelled to charge down as low as 800 lbs. of coal to a retort in a day. I have no doubt, if the benches could be worked continuously, or with what we might term the "sister bench"—*i. e.*, the bench upon the other side of the arch—in operation, there would be no trouble to produce from 13,000 to 16,000 cubic feet of gas per day per retort.

The President—It would depend upon the size of the retort.

Mr. Stiness—That is the very thing. The days of 12" by 20" retorts have gone forever. It is the large retorts (those that will take up 400 to 450 lbs. and burn it off every four hours with the same quantity of coke formerly used as firing material under the common 12" by 20" retort) that will have to be employed.

The President—What is the size of your retorts?

Mr. Stiness—14" × 26"; and 16" × 30".

The President—If Mr. Stiness has really got a specific for pitch and for stopped stand-pipes, I would like to give him a job in one of the sections of the Boston gas works. I must say I do not altogether agree with him about his having got a specific; but I am very glad indeed that he has got some means for removing pitch and tar from the main. I am perfectly free to confess, however, that I would like to see him do it a little more extensively than has been done at present. I visited his works last year, and we then had some discussion on the question. If I remember correctly, the gases were passing through the section of the main in which no gas was made, and the tar was taken off at the end?

Mr. Stiness—Yes, sir.

The President—And by that time the hydraulic main is drawing nearer to the brickwork.

Mr. Stiness—Yes, sir.

The President—I should be better satisfied to hear that there was no accumulation of pitch in the hydraulic main if those two fires were under it.

Mr. Stiness—Directly on the opposite side we have three benches working in the way noted by the President. Mr. Nettleton saw the operation, and I explained to him that that was the experiment which Mr. Greenough spoke of. I prefer to have the three benches working, because that tends to keep the tar more liquid as it goes off. I think the hardest test to put upon a main is to place it upon a bench that is in use, and with other benches—cool benches—running to the take-off. In one case with us we have it on one working bench, while two are idle; and in the other case three benches work continuously to the end of the main.

The President—I am very glad to hear that that objection raised by me has been removed. I think the matter is worthy of further consideration and investigation by all of us. There has been but one satisfactory explanation which has occurred to my mind for the difficulties which occur from time to time, and which are apparently inexplicable, in regard to the formation of pitch. That explanation is this: I have been gradually led, by an examination of the circumstances, to believe in the existence of a personal

devil. (Laughter.) I do not see any other way in which you can account for the fact that on one side of the retort house you are working with entire peace, and have no trouble whatever from pitch, while on the other side of the house you are stopped up solid, have nothing but trouble, and have to pass a Sunday afternoon (not personally but by proxy) in cleaning out your hydraulic main. Yet, with one main, that is the condition under which we have been struggling for the past year; while another hydraulic main, constructed in exactly the same way, gave us no trouble whatever. What may be the reason of the difference is something I do not know. We have been struggling over it in every possible way. We have endeavored to cool it off by thickening the brickwork underneath it; and we put water enough in it to make a flood. In fact, we have done everything to remedy the difficulty; and I cannot imagine what the trouble is. We think perhaps it is in the shape of the retort, as much as in anything else. We propose to take out those retorts, and to put in some large D-retorts, which seem to distill the coal without reducing any of the gas into a condition in which it would deposit pitch. The retorts are not excessively hot; the yield is not excessive; the charges are not heavy; the retorts are not as heavy as those which make gas without pitch; and yet we have had it there to such an extent that the life of the Superintendent has been burdened with it all winter. If it can be obviated by tilting up the hydraulic main on one end, and letting the pitch run out of the other, I think it is a resource which is worthy the trial.

Upon motion, a vote of thanks was tendered to Mr. Stiness.

Mr. Stiness—I would be very much pleased to see anyone at our works where can be seen the inclined main and its action contrasted with the old style.

Next Place of Meeting.

Mr. Gerould, from the Committee appointed to recommend a place for holding next annual meeting, reported that the committee unanimously favored holding the next annual meeting in the city of Boston. The report was accepted.

Election of Officers.

Mr. Sherman, Chairman of the committee named to report a list of officers for ensuing year, submitted the following nominations:

For President—Jno. P. Harbison.

For Vice-Presidents—A. M. Norton and R. B. Taber.

For Secretary and Treasurer—Chas. H. Nettleton.

For Directors—Geo. B. Neal, W. A. Stedman, C. L. Gerould, C. F. Prichard, H. A. Allyn.

On motion, the report of the committee was received, and the President deputed Mr. Stiness to deposit the ballot of the Association in favor of the election to office of the gentlemen above named. Mr. Stiness complied with the instruction, and the President thereupon declared that the candidates had been duly elected as officers of the Association for the current year.

On motion of Mr. Stedman, Mr. Jno. P. Harbison (the President elect) was invited to a seat on the platform. When the applause that greeted Mr. Harbison's appearance had subsided, that gentleman spoke as follows:

Will you kindly permit me to say that I had hoped the intelligent committee appointed to bring in a list of officers for this Association for the ensuing year would have intelligently and properly considered the interests of the Association, in their recommendation of one to fill the office of President during the next term. They, however, have seemed to overlook that point—having brought forward my name—and the Association has seen fit to unanimously endorse their verdict. In accepting the position, Mr. President, I cannot forget that I am to be your immediate successor. I remember that I am called upon to succeed one who has most gracefully, and with signal ability, presided over the deliberations of this Association during the past two years. This recollection makes me somewhat diffident; but, sir, I shall, as President, do the best I can to conduct whatever may fall to me in the line of my new duties in as efficient a manner as I know how. I feel the more encouraged because we have such an indefatigable and able Secretary, always ready and willing to take the laboring oar. I also know that I may rely upon our brother members to keep up their reputation for active work in assisting to make our meetings interesting and profitable. (Applause.)

The reading of papers was now resumed.

[To be continued.]

[A Paper read before the Guild of Gas Managers.]

Cooling Gas.

By C. F. Prichard.

Cooling gas is one of the most important operations of gas making; and, perhaps, it might be termed *the* most important—for certainly in no other department of our industry will an equal outlay of time, money or care return so large a yield on the investment. A properly arranged system of cooling requires the minimum of care and repairs, which it repays a hundredfold in improved candle power and even yield; while an improper system is an expensive, invisible leak, and the foundation of future troubles from stoppages and naphthaline.

The mixtures of solids, liquids and vapors issuing from the stand-pipe, at, say, 140° F., confronts us with this problem: How shall we reduce the temperature to a point at which it can safely be distributed, retaining as many as possible of those vapors which can be distributed, and doing away with those which cannot.

Upwards of 93 per cent. of the gases finally retained consist of hydrogen, marsh gas, and carbonic oxide, with a small amount of nitrogen, oxygen and carbonic acid. These are permanent gases, and will remain in their original condition, under ordinary changes of heat and cold. It is only in the chemist's laboratory that they yield to intense cold, combined with enormous pressure, and become liquid. So we may say that, excepting the change of volume due to change of temperature, they are not in any way affected by the operations of gas cooling. They remain practically as useful to the gas maker as ever, if plunged from a hot retort into a multitubular condenser surrounded by ice cold water.

Deducting those there remain, then, the solids, liquids, and about 6 per cent. of illuminants. The two former, if left to themselves, will settle out through the influence of gravitation; and it is only to the latter that the problem of cooling particularly applies.

Upon these illuminants, called hydrocarbons, because composed of hydrogen and carbon, depends the quantity of light, modified somewhat by the other constituents of the gas. Their importance is shown by the fact that 5 or 6 per cent. is sufficient to make ordinary coal gas of 18-candle power; and as we succeed in retaining more or less than this amount, so does the quality of the gas produced rise above, or fall below, 18-candle power.

That the gas can carry more illuminants than it does is shown by the fact that a large amount of ordinary naphtha, if poured into the mains, will be taken along and consumed at the burner; and that we make more than we distribute is proved by the tar distillers' records, which show one tenth of the weight of tar produced in light oils—oils which are better than those for which we are content to pay 5 or 6 cents per gallon. Could we retain even a portion of these, the illuminating power would be increased several candles.

These facts, taken in connection, show that we make more illuminants than we distribute; and that while the gas is willing and ready to carry more, a portion escapes us, and we only distribute 5 or 6 per cent.

These hydrocarbons can be chemically classified and described; but for retort house purposes they may be roughly divided into three classes.

1.—Those which are gases under ordinary conditions. These can be easily retained, and frequently are about all that are retained.

2.—Those which might be expected to liquefy long before the temperature reaches 60° or 70°; but gas has an affinity for them, and is capable of carrying a large amount in the same manner that it carries naphthaline, although this is a solid.

3.—Those which, while vapors when issuing from the stand-pipe, rapidly become liquid on reduction of temperature, and probably could not be retained by any means.

These distinctions are not absolute, for the third class (or heavy tars) can be found in any carburetter—no matter how pure the enriching material may have been—showing that the gas has deposited them to take up more acceptable vapors; while on the other hand, no matter how carefully the condensation may be carried on, the lighter oils can always be found in the tar.

The problem thus becomes reduced to a consideration of how to treat this second class to retain as many as possible of the vapors; and were it not for the fact that the heavier vapors dissolve the lighter ones and carry them down into liquids, the problem would be the comparatively simple one of fractional distillation. But it is found practically impossible by the oil distiller or the gas maker to separate completely one grade of hydrocarbons from another.

Bearing in mind the fact that those hydrocarbon vapors which it is not possible to retain are saturated with those vapors we wish to retain, it is shown that if we suddenly reduce the temperature of the mass, by immersion in water or other severe means, the whole is precipitated into liquid. Once liquefied we are liable to lose the light hydrocarbons—for, even if passed through a hot scrubber, a much higher temperature is required to free them from a liquid than would have kept them free when a vapor; and this is particularly true of the condensed heavy hydrocarbons, or thick tar. If, on the other hand, the temperature is gradually reduced, especially while the solids and liquids are in suspension, and the temperature at its height, the heavier hydrocarbon vapors lose some of their power to retain the lighter ones as the temperature falls, and they near their condensing points, and time is given for the latter to disengage themselves.

Gradual condensation or cooling is the necessary condition as demonstrated by both theory and practice; and the more gradual the better, particularly when the temperature is high. The box or scrubber at the end of the hydraulic main, where the gas is comparatively still, and the tempera-

ture maintained high by the natural heat of the gas, or the hot scrubber, where the heat is maintained by artificial means, ti l the heavier vapors are condensed, owe their efficiency to this cause; after them come the underground condenser, the air condenser, the water condenser, and others, more or less efficient as their cooling is more or less gradual.

The point to be arrived at seems to be to separate as completely as possible the light fr m the heavy vapors. Twenty years ago the late W. R. Bowditch wrote this significant passage: "Gas can take up and carry a considerable quantity of the vapors of the lighter hydrocarbons, if they be brought into contact with it after having been separated from the heavy ones." This principle is r. cognized better now than then; and carburetting condensers built on this plan have had considerable success by keeping the light tars in contact with the gas after the heavy ones have been removed.

Time, however, will not permit a review of the points concerning the contact of tar and gas, although intimately connected with this subject.

The Natural Gas Craze.

Mr. Jno. F. Carll, of Bradford, Pa., has been paying rather close attention to the subject of natural gas, and the result of his inquiries seems to be that he inclines to the pessimistic side in the matter of longevity of natural gas wells. In the February issue of *Petroleum Age* he thus comments on what he terms "the natural gas craze:

Only about a quarter of a century has elapsed since the first flowing oil and gas wells on Oil Creek introduced petroleum to the world in sufficient quantities to make it commercially valuable as the basis of a new illuminant—an insignificant time when counted by years, but an important and wonderful period if measured by the achievements of those engaged in producing, transporting and refining petroleum, and by the practical and scientific results which have been given to the world.

The history of early petroleum developments is familiar to all. How Oil Creek suddenly became a Mecca to which fortune-seekers flocked from all parts of the Union; how some of the pilgrims, captivated by delusive promises of immediate wealth, concluded to remain a few months to secure a competency—which, alas, after years of anxious toiling, came only to a few of them; how others, equally infected, returned home to develop lands in their own neighborhoods wherever gas vents or oil seeps could be found; how oil companies almost innumerable were organized in the city, town and country with capitals aggregating many hundreds of millions of dollars; and how all this infatuation ended in almost universal disappointment and bankruptcy—not because there was no reality in the business of petroleum mining, but on account of the extravagant and injudicious manner in which these early developments were conducted.

"History repeats itself." The fact having been established that fuel-gas can be profitably piped and utilized for manufacturing and domestic purposes, a craze for natural gas developments quickly springs up and spreads throughout the land. Now Pittsburgh is the center of attraction, and delegations from all parts of the world are visiting the city to inspect the methods of handling the new fuel and study the effects of its practical application to the various purposes to which it is adapted. All who come are captivated by what they see and learn. It seems a small matter to drill a hole in the ground and lay a few miles of pipe. Why not every town have its own gas well? The infection quickly spreads; natural gas companies are easily organized, and now experimental wells are drilling in nearly every State of the Union where there is the slightest possibility of obtaining the coveted treasure.

Is it not probable that this gas craze will end as disastrously to many of the company shareholders as the petroleum fever did? Are not gas wells surrounded by the same elements of uncertainty as oil wells? Will they not exhaust as oil wells and old-time gas wells have? Will not speculative competition and injudicious drilling deplete the gas reservoirs more rapidly than prudence would dictate, and eventually occasion loss even to companies which endeavor to manage their own affairs wisely?

Many are investing in these enterprises in the belief that natural gas is inexhaustible—that with the plant paid for and the consumers secured, nothing remains to be done but collect revenues, pay a few salaried employes and declare dividends *ad infinitum*. But do the experiences of twenty-five years in petroleum mining furnish any grounds for such a belief?

About 50,000 wells have been drilled for oil since 1859. Many of them proved to be large natural gas wells, similar in all respects to those which are now being utilized, and it is an unquestionable fact that the same geological conditions are common to both the old and the new. Can any one well be found among this 50,000 to sustain the theory that gas is inexhaustible? Do we not positively know by experience repeated over and over again that the longevity of a pool of oil or gas depends entirely upon the rapidity with which its cover is perforated by drill holes? And do we not know, also, that an oil pool may be profitably productive long after the gas has ceased to have any practical value for piping purposes?

In the Triumph district, with 120 feet of sandrock reservoir—the thickest and most permeable sand bed ever found in the oil regions, and probably the richest in oil or gas, in proportion to its acreage—fifty wells or more continued to produce oil profitably, several years after the gas might be said to be almost absolutely exhausted, for gas pumps were in use on all the wells and the gas became so rarefied in the rock that a vacuum gauge showed a down pressure of about twelve pounds to the square inch. It is evident that this could not have happened if the gas was inexhaustible, or if it was generating with any considerable degree of rapidity.

The history of the leading characteristics of one pool must be the history of all, for all are similarly conditioned, whether stored with oil and gas or with water and gas. They contain certain quantities of fluid—the accumulations of ages—and every day's draft upon them lessens the quantity remaining as surely as every ton of coal removed from a colliery leaves so much less to be mined. Some of the deposits are very large, some are comparatively small, but even the largest can be quickly depleted by unrestricted drilling; and when a gas pool is so relieved that its pressure is but little in excess of atmospheric pressure it becomes valueless except for local purposes, for gas under such tension, although it may have considerable volume, cannot profitably be conveyed through long pipe lines; and admitting that oil and gas are still being generated in the rocks, the history of 50,000 wells already drilled shows the folly of hoping for any practical assistance from that source.

The fallacious notion that natural gas deposits will be more enduring than petroleum deposits have been, needs correction. No good reasons can be assigned why the average life of a gas pool should be greater than that of an oil pool. Indeed, if the probabilities are considered, the chances for longevity appear to be in favor of the latter. Oil, when produced in excess of daily demands, can be tanked for future use; accumulating stocks depress prices; low prices retard developments, and thus prolong the life of a pool—and, as before cited, *oil* can be pumped with profit after *gas* has been practically exhausted.

Gas cannot be tanked like oil, and in most cases no preparations are made for controlling and saving it in the wells; all daily surplusage is wasted; there can be no accumulation of stocks above ground to affect market values, hence prices are more likely to advance than to decline, and all increasing demands must be met by new wells.

The location of a gas pool is evidently a very important factor in estimating its probable life. If situated where only a limited market is to be supplied it may be lasting; but, if near a large city which cannot be surfeited, it must soon be exhausted by the excessive drilling of speculators and competing pipe lines, and it would not be at all surprising if some of the gas pools now starting out with the greatest promises should have brilliant but short-lived careers, similar to Cherry Grove and Thorn Creek.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Annual Report of the San Francisco (Cal.) Gas Light Company.—At the annual meeting of stockholders of the San Francisco Gas Light Company Messrs. Joseph Durbrow, E. E. Eyre, Adam Grant, J. B. Crockett, Levi Strauss, Thos. Menzies, and P. J. Donahue were chosen as a board of directors for year 1886. Subsequently the board organized by re-electing J. B. Crockett to the Presidency, and W. C. Barrett to the Secretaryship. Perhaps not as much interest was taken this year in the proceedings as had been manifested on similar occasions in the past; and this state of affairs may be accounted for on the ground that the business of the company presents no unusual feature. In 1884, shareholdings to the extent of 92,360 were voted on at the annual meeting; 1885 developed a vote on 86,916 shares; and the '86 vote represented but 75,521 shares. There was no opposition ticket in the field, and the only changes which are noted in the *personnel* of this year's board, as against its predecessor of '85, occur in the case of E. P. Murphy, who is succeeded by Levi Strauss, and of Peter Donahue (deceased), whose place is taken by P. J. Donahue. The once familiar figure of Peter Donahue, who was the founder of the company, was sadly missed from the gathering, since it had been his invariable custom to be present on such occasions. President Crockett's annual report conveyed the information that the Potrero station had been finished during the year, and the carbonizing capacity had been thereby largely increased. Increased main facilities had been secured; and further distribution changes that were in contemplation would do away with the necessity for maintaining the King street station. The value of the coal supplies carried at present in store equaled $271,365; and that included a full year's supply of cannel. The company also had contracts out "for coal to arrive" which covered 43,000 tons. The contracts for lighting the public buildings expire on 30th day of April; and those governing street lighting terminate with July 31st. No doubt was entertained that the municipality would renew the contracts on basis of present figures. At commencement of fiscal year of '85 the company carried a debt of $95,000; but this had been wiped out, and the stockholders had received a total dividend within the twelvemonth of $150,000. President Crockett concluded his annual statement by remarking that the company was in a prosperous condition;

and said there was every reason to anticipate that stockholders would receive a monthly dividend of 30 cents per share in current year. The Secretary's report proved that the bills rendered against the municipality during year amounted to $215,918. Salaries and wages account total was set down at $391,089, a decrease from previous year of some $3,000. During year 4,624 new meters had been set, and 3,622 meters were removed—a net gain of 1,002. The assets of the company, on Dec. 31st, 1885, were set down as follows:

Real estate	$1,370,302
Buildings, machinery	2,483,723
Mains, meters, etc	2,279,922
Coal, lime, etc	279,155
Due from city	56,102
Cash on hand	4,019
Bills receivable	109,618
Miscellaneous	12,919
Total Resources	$6,595,760
Liabilities	30,137
Net resources	$6,565,623

The San Francisco Company has decided upon working in harmony with the Pacific Gas Improvement Company, and the rate of gas, as fixed by action of the Supervisors, is $2 per thousand cubic feet. We are sorry to add that President Crockett is not enjoying the most robust sort of health; and, if our information is correct, he is, in fact, at present engaged in an attempt to regain his former physical condition by means of travel. That he may be entirely successful is the earnest wish of all who know him.

Personal.—Mr. W. J. Fay, of the Denver (Col.) Gas Light Company, recently made a flying trip to the East, and he speaks in glowing terms as to how the gas business progresses in the "elevated city" which constitutes the commercial heart of beautiful Colorado. Last winter the maximum output of the Denver Company (during 24 hours) reached the total of 470,000 cubic feet, and more than once the plant was strained to its utmost limit. The railroads have actually woven a web around the spot originally chosen whereon to construct the gas works, and while this "web" has vastly increased the value of the company's real estate, it also prevents it from making necessary extensions. In order to overcome this, we believe Mr. Fay has purchased a plot about 4,500 feet distant from the present location, and on the new section a carbonizing and condensing plant will be erected. The gas will be conveyed from the new retort house over to the present purifying apparatus (which is sufficiently ample) and holders. The lowest price charged for gas in Denver is $1.80 per thousand, the general rate being $2. The water gas project quietly slumbers, and we fear it may be numbered among the missing for all time, since naphtha out in that district is worth about 14 cents a gallon, whilst a good article of gas coal can be purchased for, say, $5.25 a ton. Mr. Fay assured us that he would be on hand at the American Association meeting to be held in Philadelphia, Pa., next October.

A Few Interesting Figures Concerning Day Consumption at Certain Points.—Through the courtesy of our correspondents in the various cities below mentioned, we are enabled to present the following figures—which are official—in regard to the average day consumption enjoyed by those in charge of the gas plants in the localities enumerated: New Bedford (Mass.) Gas Light Company, 13 per cent.—the maximum summer figure there is 20 per cent.; Derby Gas Light Company, of Birmingham, Conn., 20.6 per cent.; Newark (N. J.) Gas Light Company, 14.4 per cent.; Cincinnati (Ohio) Gas Light and Coke Company, 32.5 per cent.; Columbus (Ohio) Gas Light Company, 25 per cent.; Indianapolis (Ind.) Gas Company, 20 per cent. The Indianapolis folks have 1,400 gas stoves in use, and they expect to dispose of more. Gen. Hickenlooper, at Cincinnati, has also been most successful in introducing gas stoves for cooking operations; and we believe that Mr. Harbison, at Hartford, has met with great success in a like direction. Judged by the rate at which attention is now being bestowed upon the matter of introducing and extending the employment of gas for other purposes than that of lighting, it will not be long ere the item of day consumption will have assumed huge importance. We would be glad to publish statistics similar to those above given from other cities and towns in the country.

The Way the Cincinnati (Ohio) Electric Light Suppliers Figured it out.—Some short time ago the branch of the Edison incandescent electric lighting company whose managers agreed to light the Central Union Railway Depot at Cincinnati, Ohio, published a statement purporting to give figures that showed how much money was being saved to the railroad companies through having substituted electric light for gas in the illumination of the depot waiting rooms, train yards, etc. When the electric lighting promoters secured the contract they agreed—the depot owners were to furnish boilers, steam supply, and free use of space for the electrical plant—to do the lighting at a cost not to exceed the sum formerly paid for gas, the figures to be determined by the consumption of gas during *any* one week in the year. The one week was selected, and the result was blazoned forth that the gas consumed during the eight days of trial cost $497.28; *per contra*, the Edison light for an equal period cost but $343.29, giving a net saving in favor of the latter of $153.99. Of course, it need hardly be told that the Edison "comparers" were no wise lavish in their estimate of cost of steam, etc., supplied from the boilers of the depot managers; and it may be assumed that every favorable item was duly seized upon. But the "true inwardness" of the test is developed when the particular eight days selected are disclosed. They appropriated the eight days of the 365 when the greatest quantity of gas would be required for the lighting of the depot, and thereon made their comparison. Had they chosen, say, eight days in July, the relative charges would stand about thus: The electric light cost would, as before, stand at $343.29; *per contra*, the gas charges would stand at $165.76, or over 50 per cent. less than the showing made by its competitor. Gen. Hickenlooper is on record as saying that he would not hesitate for one moment in guaranteeing to light the depot building with gas better than it is now lighted with electricity at a sum equivalent to one-third less than the price at present paid for the latter service. The Cincinnati electricians forget to mention in the list of places illuminated by them in that city, that the "light of the future" has been removed from the city water works—where power should be plenty—the Queen City Rink, Billigheimer's billiard hall, the Gibson House, the Palace Hotel, etc.; but it is not likely they would be inclined to mention such trifling matters—especially in view of their straightforwardness (?) as to the details of days and dates on which the depot test was made. According to the report of the Board of Commissioners (who allowed themselves to be cajoled into adopting the electric lighting system at Music Hall during the continuance of the last Industrial Exposition) it is perceived that the Edison Company, on account of incandescent lighting, received $4,415; the Brush Company, on account of arc lights, received $1,650; and the Cincinnati Gas Company, on account of gas supplied, received $2,642—or a total of $8,707. Contrast that with the average price paid when gas was the exclusive illuminating agent and what do we find? Simply that an average covering several years shows the gas company was paid at the rate of $3,129.50 per annum. The average comparison over several years is just and proper, since the increased rate for the supply furnished in the earlier periods will more than overcome the increased quantities of gas demanded by the purposes of the exhibition in the later years, as a concomitant of its growth and enlarged scope. The standing of electricians in respect to the lighting of the City Water Works establishment is just as striking. From the report made by the engineer (Mr. W. H. Boeh) as to the cost of lighting the department with electricity—the report was presented to his superiors on date of March 25, 1885—we find he places the annual cost of such illumination at $3,547.14; while the same premises during 1884, were satisfactorily and efficiently lighted by gas at a charge of but $1,300. Mr. Boeh summed up his finding in the sentence, "The light is, therefore, unsatisfactory to me on account of its unreliability, and further on account of its expense." It might be as well to give an extract or two from Mr. Boeh's statements relative to the matter of the unreliability of the light as proved by careful determination, and we here append the remarks in regard to same:

"The Brush Electric Light Company put in the apparatus, and during the 90 days' test furnished the attendance. At the expiration of this time, I expressed my dissatisfaction on account of its not being economical, and because unsuitable. One thing I did not mention, and that was its unreliability during the ninety days' trial—it having failed twelve times, and gas had to be resorted to. Upon receipt of my report, and after hearing the arguments of the Brush Company, your Board permitted an additional 30 days' trial. During this time the gas was turned off at the meter, and the dynamo was run continuously for 24 hours per diem, and it failed four times.

"To test the brilliancy of the light, Prof. French, of the University, was employed. He tested 12 lamps and found the average to be 15.61 candle power, this being 4.39 candle power less than mentioned in the proposal of the successful bidder, which calls for 150 lamps of 20-candle power each.

"I think it can be demonstrated that while a new lamp may show a light of 15-candle power, it gradually deteriorates; and long before it is entirely burnt out it will show a light of only one-half or one-third of the original power." All fair-minded observers must concede that the above furnishes sufficient evidence to confute the statements made by those pecuniarily interested in Cincinnati electric light schemes, that their illuminating agent can in any sense compete with the gas sent out from the plant of the Cincinnati Gas Light Company, either in respect to price or lighting service.

The Outlook for Gas Coal Prices.—Owing to the gravity of the labor situation it is a pretty hard matter to predict with reasonable safety as to the course of prices of standard gas coals, delivered at eastern points, for current year. The Penn and Westmoreland mine hands are out on strike; and the situation is all uncertainty. We do not think that higher prices are to

be recorded; and, from present indications, it looks as though the rates which prevailed last year are likely to obtain again at all prominent eastern points—possibly slight concessions may be granted, but the outlook for such consummation is rather slim. To sum the whole matter up—the key to the situation rests with the miners.

CHEAPER GAS FOR CADIZ, OHIO.—Mr. A. M. Hammond, Secretary and Superintendent of the Cadiz Gas Light Company, informs us that with first day of this year the following schedule of selling rates took effect. The discounts are granted only in case of prompt payment—*i. e.*, within five days from time of presentation:

To consumers using under 1,000 feet per month			..	$2.50	less 25 cts. per M.
"	"	from 1,000 to 2,000 "	..	2.25 "	25 "
"	"	from 2,000 to 3,000 "	..	2.00 "	20 "
"	"	from 3,000 to 10,000 "	..	1.80 "	20 "

The prior rate was $2.50 per thousand to all classes, with a discount of ten per cent. for prompt payment. In 1880 Cadiz had but a small population, although its subsequent growth has been fairly rapid. However, with all the strides taken, the Cadiz company's output during the past year has not quite reached a total of two millions cubic feet; and Mr. Hammond may be honestly congratulated on the fact that his company is disposed to take the royal road in the matter of gas supply.

A "NOTE" OR TWO FROM ST. LOUIS, MO.—The Laclede Gas Light Company is now running pricipally on West Virginia cannel as an enricher. The only oil employed is worked up through the Egner apparatus. Mr. Egner reports that his process develops better results every day; and is of the opinion that it finally will answer to his original claim. We are assured that the rumor regarding the effort of the Equitable Company to secure the right to erect a works in St. Louis is founded on fact.

SOMETHING FROM WACO, TEXAS.—Quite a boom in gas matters is reported from Waco. Mr. J. T. Patton, Secretary and Superintendent at that point, has decided to put in the Egner apparatus. Contracts have been awarded to the Kerr-Murray Mfg. Company, of Fort Wayne, Ind., for the erection of a holder of a capacity of 50,000 cubic feet, and to the Smith & Sayre Mfg. Company of New York, for exhauster and condenser, the latter firm also to construct a new set of 8′×8′ purifying boxes. Contracts for a new station meter, consumers' meters, and photometrical apparatus have been made with the American Meter Company, Harris, Griffin & Co., and Helme & McIlhenny. We have not been advised as to the particular pieces of apparatus to be furnished under the agreement with the last-named firms. Waco has been supplied with gas manufactured under the Edgerton process, and the results were not altogether satisfactory. We understand that when the improvements and alterations are completed the Waco gas consumer is to be treated to a reduction of over 50 per cent in selling rates. It should have been explained that one reason why Mr. Patton decided to put in the Egner apparatus was because its employment permitted the manufacture of either coal or oil gas.

CHEAPER GAS FOR IRONTON, OHIO.—Mr. W. W. Prichard, Sec. and Treas. of the Ironton Gas Company, has been "putting his house in order," and he has been so successful in the "house cleaning" attempt that he now comes forward with a decreased schedule of prices, the same to apply to all gas consumed from first day of current month. The scale is appended:

For first 1,000 cu. ft. or less	.....	$2.00 per M.
For next 2,000 " (1,100 to 3,000)	.....	1.90 "
For next 7,000 " (3,100 to 10,000)	.....	1.80 "
For all over 10,000 cubic feet	.....	1.70 "

If bills are paid within first ten days of month a discount of 5 per cent. will be allowed from above rates. In the circular announcing the reduction to Ironton's residents, Mr. Prichard gives them many valuable hints, a table of likely hours of burning during the different months of year being especially noteworthy. He also says: "Please bear in mind that the gas business, like all other legitimate businesses, flourishes most where it receives fair treatment; that whatever tends to discourage the use of gas by others, tends to make your gas cost you more; while, on the other hand, the prosperity of the company brings a direct saving in your expenses." "Which nobody can deny." The Ironton gas folks have put in a new 8-inch main in direct line from the works to the upper part of the town—3,450 feet in length—which tends to equalize the pressure. The works have been thoroughly overhauled, and the Ironton establishment is now in excellent "fighting trim." The former great drawback at Ironton was an excessive leakage account; and to reduce this item was the most important problem that confronted Supt. Prichard. How he succeeded is best explained by submitting the following figures: In Nov., 1885, the company manufactured 14,920 cubic feet less gas than during same month in previous year, while the receipts show that in '85 71,000 cubic feet were paid for in excess of that paid for in '84. Brother Prichard's "leak hunting" expedition must accordingly be set down as "a best on record." Besides the 8-inch main line put down, distribution facilities were further improved by the placing of 1,811 feet of smaller conduits. We hope to prevail upon Mr. P. to furnish an account of the plan under which the leak hunting campaign was conducted.

FLOOD ECHOES.—There was "something up" at Lawrence, Mass., which prevented Messrs. Cabot and Humphreys from being in attendance at the Providence meeting of the New England Association. The "something" consisted of the fracture of an important gas main (probably a conduit that passed underneath a bridge), caused by the violence of the February floods. The pipe was flooded for perhaps 1,500 feet; and every gas man knows what that means. Between noon of Sunday (Feb. 14th) and sundown of Tuesday (Feb. 16th) Manager Humphreys' lot was "not a happy one." The Norwich (Conn.) gas men also had a lively time; but soon got straightened out. Perhaps the folks upon whom the greatest amount of sympathy was lavished were those in charge of the Schenectady (N. Y.) plant. The Associated Press telegrams from that direction were highly charged with accounts about the submerging of the gas works, the great monetary loss, etc. Mr. Robt. Clements, Supt. of the Schenectady Company—and we believe he ought to know about it—says that the floods did not interfere with them at all. The plant at Fulton (N. Y.) is reported to have suffered somewhat.

THEY WANT TO SELL THE BONDS.—The United Gas Improvement Company is most anxious to dispose of an issue of $300,000 of first mortgage bonds (to run 30 years, and to bear 6 per cent.), the security being the entire possessions of the Omaha Gas Manufacturing Company, of Omaha, Nebraska. To "hook the gudgeons"—*i. e.*, the desired purchasers—a "book has been printed," which conveys the news that the company's annual output for 1885 was 43 million cubic feet, which was placed in the holder at a cost of $42,100. Of course, the "book" don't say anything about "placed in the holder," as Mr. John A. Cole, who compiled the figures, puts them down in his own way; but a trifling analysis reveals their worth or otherwise. Still, his figures "act badly" in any event. According to his reckoning the Omaha consumer is forced to pay an average price of $2.33 per thousand for a gas that costs the manufacturer only $1.08 per thousand; and which certainly ought to furnish food for pleasant thought when the consumer steps in to settle his bill. Then, again, if the Omaha branch of the balloonist coterie has such a "good thing" out in Nebraska, why do the members thereof not "take up" the entire issue of bonds which they have been trying so earnestly to float? Possibly, because "things are not always what they seem." In regard to the superior brilliancy of the Omaha gas product we note that Mr. Cole, in his "book," says: "From all I could learn, the gas made is of excellent quality, giving good satisfaction to consumers. This will be still better, or *more uniformly* good, when the *new holder* and *its connections* are completed." Perhaps Mr. Sherman, (of New Haven, Conn.) had Omaha in his eye when (during the discussion on Mr. Rollins' paper at the February meeting held in Providence) he remarked in substance that the water gas process would hardly do away with the necessity for storage vessels just yet. From Mr. Cole's view of the matter, holders out in Omaha are wonderful instruments—especially as their influence may be counted upon to increase the illuminating capacity of the vapors stored within them. Another "hint" thrown out by Mr. Cole is to the effect that, "The works can be changed back to coal gas works by an expenditure of $50,000;" and we would add the suggestion that the people of Omaha would be better served with coal gas as the agent to supply their lighting requirements. Indeed it might seem to some, if the statements in the "book" are to be relied upon, that a better investment channel for money could be found than is afforded by the "first mortgage bonds of the Omaha Gas Mannfacturing Company."

GAS MATTERS IN HELENA, ARKANSAS.—Mr. John J. Hornor, proprietor of the Helena Gas Light Company, paid us a visit last week, and we may say that he is most sanguine as to the future of the Helena plant. The works were built in 1872, and are located at a safe distance from the waters of the Mississippi River, but within easy reach to admit of securing fairly cheap coal supplies. The town has a population of some 5,000 souls, and cotton is the chief staple of the district. A diversified plenty of good timber growths—such as white ash, oak, poplar, and dogwood—maintains a trade and business second only in importance to that enjoyed by "King Cotton." But the great drawback to Helena's future business outlook is the all too large number of lazy negroes who claim it as their home. Mr. Hornor originally invested the sum of $60,000 in the Helena gas enterprise—most of our readers will remember the abnormally high prices which were the rule in 1872—and for that investment he secured a well constructed 6-inch plant. It contains two benches of threes, with the balance of the apparatus necessary for the easy production and delivery of quantities equal to the maximum demands of the gas consumers. Pittsburgh coal is carbonized, and it costs

about $4.10 per ton. Coke meets with a ready sale, at the rate of 10 cents per bushel. The street lamps are equipped with four feet burners, and the illuminating value of the gas product is equal to 20 candles. Originally, the price charged for gas was $6 per thousand cubic feet, and for years Mr. Hornor's investment yielded him no return. He finally decided to try the cheap gas plan, and about a year or so ago adopted a graded schedule, with highest figure at $3, and lowest at $2.50. The gain in output was so marked that net results for '85 disclosed a goodly profit, and the first dividend in the history of the company was declared and paid at the close of the twelve-month. Always convinced that gas making could be made a profitable enterprise even in Helena, Mr. Hornor now intends to place the gas business there on such a footing that the dividend paying plan will be steadily adhered to.

CHICAGO (ILLS.) AS A GAS ABSORBER.—The Chicago *Tribune* makes the estimate that 2,500 millions cubic feet of gas will be consumed in that city during the current year. It says that the government structures lighting requirements absorb 1½ millions cubic feet each month, and asserts that the Grand Pacific and Palmer House hotels each consume one million cubic feet every 30 days.

THE CHICAGO (ILLS.) BRANCH OF THE EQUITABLE COMPANY.—A Chicago authority asserts the Equitable Company will be ready to supply gas in that city on Jan. 1st, 1887. They are to have storage capacity for two millions—two holders, each to contain one million.

THE PHILADELHHIA GAS WORKS.—In spite of the efforts of certain parties, the Philadelphia gas works are far from the point of being turned over to the mercies of the "gang" who would like to take up the Broadway (N. Y.) railroad scheme when the famous milk-bibbing Sharp (named Jacob) gets ready to drop it.

OUR STATE LEGISLATORS.—Our Albany (N. Y.) solons are girding on their armor—because they fear (?) they will have to make a strike.

Notes from the West.

By RETORT.

March 9, 1886.

The natural gas excitement of Ohio has extended into Indiana—the vicinities of Richmond, North Vernon, Indianapolis and New Albany being most greatly affected thereby. The latter has displayed the most enterprise thus far; but with (comparatively) no success. At Indianapolis a well will be sunk with the prime object of securing water; but, under the supervision of Prof. John Collett, ex-State Geologist, who is excellent authority on the natural gas question, they will endeavor to ascertain the probabilities of finding gas. The Prof., however, is very positive in the belief that natural gas will not be found in that part of the State. At New Albany the glass manufacturers are exceedingly anxious to find a deposit, in order to successfully compete with the Pittsburgh district. Mr. De Pauu, the wealthy plate glass manufacturer, in addition to boring for natural gas, is conducting a series of experiments as to the expense and practicability of manufacturing a crude gas as a substitute; and, if successful, his experiments would doubtless prove of value to the gas fraternity—for the fact is now conceded that, should the natural gas supply fail, a crude, cheap, fuel gas becomes a necessity. It becomes a question as to a choice of using coal in its crude form, or in a "refined" condition.

Speaking of natural gas, one would suppose its cheapness might rob the "chronic kicker" of his delightful vocation; but already in Ohio his winsome voice is heard. As usual, his dulcet tones are all pleading the interests of the "dear public." At Findlay, Ohio, they have struck the "combination," and have entered into the City Council, where the matter was considered by the municipal solons, and an ordinance was passed fixing the maximum rates for cooking stoves and heaters—the former at $6.00, and the latter at $3.50 per year.

Not long since a gentleman who for many years has held gas stocks, and was subjected to the annoyance of the grumbling and discontent so prevalent here, traveled abroad for a year, and was dumfounded on discovering that even there, despite the cheap rates, the grumbling was equally as bitter and chronic as he had ever known it to be with us. He told me it was a convincing argument to him that the price per thousand bore no relation to the size or vigor of the "kick."

Bloomington, Ills., has entered upon an era of legal warfare in its gas interests, the features of the case being somewhat novel. It seems two years ago a company of gentlemen from Springfield, Ohio, built works there, expending $150,000 to manufacture water gas. The Gridley Gas Co., which manufactured coal gas, believing that they could not compete with water gas, leased their works to the new company. The water gas system proved a failure, and some months ago the new works were closed. Since then the new company have been making coal gas, and have been doing a losing business. Among those interested in the company that is defendant are P. P. Mast, Chas. Hauk, J. E. Martin, and Dr. Potter, of Springfield, Ohio.

Mr. E. B. Gridley, trustee of the Gridley Gas Company, brings the action against the Citizens Gas Light Company, and seeks to recover $15,000 on contract. We note, during the past few days, the incorporation of electric light companies at Galesburg, Ills., and Evanston, Ills., also the Highland Light, Fuel, Power and Manufacturing Company, of Highland, Ills., and the Citzens Gas Company, of Peoria, same State.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Electric Lighting Puzzles at Columbus, Ind.

OFFICE COLUMBUS GAS LT. AND COKE CO.,
COLUMBUS IND., Feb. 26, 1886.

To the Editor AMERICAN GAS LIGHT JOURNAL:—The agent in charge of pushing the Jenney electric lighting system in our section of the country has finally visited Columbus; and he is anxious that the authorities here should adopt the "light of the future" as an agent for street illumination.

Columbus has a population of about 5,000; and, as a matter of course, the Jenney Company's commissioner first appealed to our company, urging that we purchase the right, etc. Believing that it would be good policy to hear whatever argument the agent (a Mr. Chipman) had to offer in support of his proposition, our folks obtained from him the following figures, in regard to cost, etc., which are here appended. The figures are based on the maintenance of a 20-light plant:

One 20-light dynamo	$2,000 00
One engine and boiler	1,000 00
Seven miles (a low estimate) of wire, with necessary poles	750 00
20 arc lamps, at $60 each—average	1,200 00
Belts, piping, etc	150 00
Total	5,100 00

or, say, in round numbers, $5,000 as the first expense attaching to plant proper. Of course, the above estimate allows for neither ground nor buildings.

Now, with the understanding that a 20-light plant would cost as above, it is fair to presume that a 50 light establishment would cost $5,000 × 2½—or $12,500. The price at which the illuminating service was to be paid for per lamp per year was placed at $100. With the entire number in use the gross annual earnings of the 50-light establishment would be—

Receipts.—Gross income from operation		$5,000 00
Expenses.—Coal for 50-horse power engine—Mr. Chipman puts that cost (with coal at $1.25 per ton) at 1 cent per hour per h.p.; but our slack coal costs $2 per ton, which would make the cost equal, at least, 2 cents per h.p. per hour, counting shortages in weight, etc.—to run 50 lights, at 2 cents per h.p. per hour for 6 hours run each day of the 365, would alone cost	$2,190 00	
One engineer, at $1.50 per day	547 50	
One man to tend lamps, at $1 per day	365 00	
One year's water tax	50 00	
One year's taxes on, say, $10,000	250 00	
Eight per cent. interest on money ($12,500)	1,000 00	
Depreciation on machinery, etc., for year	100 00	
Total Expense		$4,502 00
Balance after year's operation		$497 50

Result gained, an apparent profit of $497.50; and secured only through a failure to allow for ground rent or cost of buildings. Also, omitting to estimate cost of such items as oil, waste, repairs to line, and expense of constructing the plant.

The statements above given are in accordance with those presented to us by Mr. Chipman; and I submit that if there is "anything" in electric light we, at Columbus, fail to see it.

When the agent went before our Council (the town maintains 105 gas lamps, at a total annual cost of $2,625) he tried to convince them that with *his* distribution of the electric lamps, annual saving might be made by substituting electricity for gas. However, we treated Mr. Chipman to an "explanatory" surprise party; and he fairly "acknowledged the corn." Taking his own figures, we proved that our authorities could not employ electricity at anywhere near the figure they now paid for gas.

What the outcome is to be cannot now be determined; but one thing that is certain is that our company will not invest in the Jenney, or any other system, until it can be shown that there is some money in such a course—money that may be made in a fair, commercial way.

Our contract with the municipality does not terminate until next October; and I suppose it will then be decided whether gas or the "light of the future" is to illuminate the streets of Columbus. Yours, etc.,

C. M. KELLER.

THE AMERICAN GAS LIGHT JOURNAL

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TUESDAY, MARCH 16, 1886.

The Market for Gas Securities.

The city gas share market developed nothing much of interest during the fortnight. Consolidated transactions were rather light, and the price recorded for it in our last has been fairly well maintained. On Saturday (13th, 2 P.M.) the tape shows a sale of 100 shares at 108, with 108¼ bid. The majority report of Senate Committee, whose members investigated the manner and methods pursued by those who effected the consolidation, sustains the latter. Nothing other than that which they were legally empowered to perform was attempted. The minority report denies the correctness of the conclusions found by the majority of Committee; and the said minority is particularly rabid—but perfectly harmless in the direction of innoculating anybody else with its virus. Senator Murphy is on hand with three bills, the most notable of which is a commission measure. It is even worse than the Sherwood-Thurber document of a year ago. The tone of market during fortnight may be written down as "dull and strong." A current rumor is to the effect that the Jersey City war of rates has been fixed up—the great strength of old Jersey City gas makes it probable that such is the case. Eastern shares, particularly those of Boston, Lowell, and Lawrence are bounding upward. Laclede (St. Louis, Mo.) is weak. Baltimore (Md.) shares are lower. We note at auction, on March 10th, a sale of $10,000 bonds of Balt. Equitable at 101; also 138 shares stock, same company, at 25.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 WALL ST., NEW YORK CITY.

MARCH 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	108	108½
Central	440,000	50	70	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	160	162
" New Stock			150	155
" Bonds	1,000,000	—	107	110
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	113	—
Mutual	3,500,000	100	136	137
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	50	—
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	126	127
Citizens	1,200,000	20	85	86
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	159	160
" Bonds	300,000		104	108
Peoples	1,000,000	10	85	86
" Bonds	290,000	—	106	107
" "	250,000	—	103	—
Metropolitan	1,000,000	100	96	98
Nassau	1,000,000	25	131	133
" Ctfs	700,000	1000	101	102
Williamsburgh	1,000,000	50	155	157
" Bonds	1,000,000	—	112	114
Richmond Co., S. I.	300,000	50	—	92
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	85	90
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	115	120
" " Bonds.	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	130	140
Peoples G. L. & C. Co., Chicago, Ills	3,000,000		8	12
Cincinnati G. & C. Co.			184	187
Consolidated, Balt.	6,000,000	100	45	45½
" Bonds	3,600,000		107	107½
Chesapeake, Balt.	1,500,000	100	73	75½
"	1,000,000		100	102
Central, S. F., Cal.			65	—
Capital, Sacramento, Cal.			55	58
Hartford, Conn	750,000	25	132	138
Jersey City	750,000	20	155	160
Laclede, St. Louis, Mo.	1,600,000	100	85	90
Louisville, Ky.	1,500,000	50	95	100
Montreal, Canada	2,000,000	100	181	182½
New Haven, Conn		25	172	180
Oakland, Cal.			35	36
Peoples, Jersey City		—	25	30
" " Bonds			—	—
Paterson, N. J.		25	90	—
Rochester, N. Y.		50	75	80
St. Louis, Missouri	600,000	50	—	575
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	58¾	59½
Washington, D. C.	2,000,000	20	212½	—
Wilmington, Del.		50	199	210
Yonkers		50	41	44
Havana (Cuba) Gas Co.	3,000,000	100	8	—
" Bonds	550,000			

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